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[OFFICIAL NOTICE.]

Forty-first Meeting, New England Association of Gas Engineers.

OFFICE OF THE SECRETARY,
EAST BOSTON, January 16th, 1911.

The 41st annual meeting of the New England Association of Gas Engineers will be held at Young's Hotel, Boston, on Wednesday and Thursday, February 15 and 16, 1911. Papers bearing on various branches of our business are being prepared. The annual dinner will be held Wednesday evening, February 15.

The following papers are to be read:

"New Coal Gas Works at Providence, R. I." Statement by J. W. Ellis. Description by Carroll Miller.

"Sign and Special Lighting by Gas," by W. S. Farrow, Cambridge.

"Gas Arc Street Lighting," by W. H. Kelley, Waltham.

"Salesmanship," by Edward Page, Boston.

"Effects on Distribution System at Springfield of Break in Water Main," by B. P. Bill.

"Consumers' Equipment Inspection," by H. K. Morrison, Concord, N. H.

Topics for discussion:

Automatic Street Lighting.
Meter Connections, Shelves and Curb Shut-offs.
Dtstrict Governors, High and Low Pressure Distribution.
Motor Vehicles in Gas Works.
Gas Company Shop Practice.

An invitation to visit the installation of vertical retorts at Providence has been received from the Providence Gas Company. This is the first plant of this kind, on a large scale, to be built in this country, and will be of great interest to the members. If a sufficient number indicate their intention of going, special cars will be attached to train leaving Boston at 1:03 P.M., Thursday, February 16, and taken direct to gas works on arrival in Providence, where lunch will be served and the works inspected, and the cars attached to train due to arrive in Boston at 6:30 P.M. Cost of trip will be about $2.

Please indicate on inclosed card if you expect to go on this trip, so that arrangements can be made with the Railroad Company.

Any suggestions for the meeting, questions for the box, or applications for membership, should be sent to the Secretary at your earliest convenience. Yours truly, N. W. GIFFORD, Secretary.

[OFFICIAL NOTICE.]

Seventh Meeting, Southwestern Electrical and Gas Association.

SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION,
1316 COMMERCE ST., DALLAS, TEX., Jan. 29, 1911.

To the Members, Southwestern Electrical and Gas Association: At a called meeting of the Advisory and Executive Committees of the Southwestern Electrical and Gas Association, it was decided to hold the Seventh Annual Convention of the Association in Houston, Tex., April 27, 28 and 29, 1911. D. G. FISHER, Sec'y.

LIBRARY OF CONGRESS, FEB 18 1911, SMITHSONIAN DEPOSIT.

[OFFICIAL NOTICE.]

Annual Meeting, Illinois Gas Association.

ILLINOIS GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
ELGIN, ILLS., FEB. 6, 1911.

To the Members, Illinois Gas Association: The annual meeting of the Illinois Gas Association will be held in the Auditorium Hotel, Chicago, Ills., March 15th and 16th, 1911. The banquet will be held the evening of March 15th.

As soon as the papers, etc., have been decided upon, the information will be forwarded. Yours truly, C. B. STROHN, Secretary.

[OFFICIAL NOTICE.]

February Meeting, Philadelphia Section, Illuminating Engineering Society.

The February meeting will be held on the 17th inst. at the Philadelphia Edison Auditorium. A paper entitled "Sun Light versus Artificial Light for the Taking of Moving Picture Films" will be read by the author, Mr. Edward L. Simons.

The meeting will be preceded by a dinner at the Hotel Continental at 6:15 P. M. Yours very truly, GEO. B. MUTH, Sec'y.

BRIEFLY TOLD.

GOING THE RIGHT WAY ABOUT IT.—It was fair to presume that the millions of money which accumulated during the period between the day the 80-cent gas law became effective under the statute, and the day that the Supreme Court of the United States affirmed the validity of the statute, would prove, to even anyone of "Big Tim's" lowest shoe string followers, that a decreased selling rate for gas really meant a decreased expenditure to the consumers whose use of gas was no greater than prior to the effective acting of the lower rate. It is all within the last 5 years that it was shown that a decrease of 20 cents per 1,000—from $1 to 80 cents per 1,000—in the selling rate of gas to the consumers served by the Consolidated and Brooklyn Union Gas Companies, meant a shrinkage in the receipts of the former Company alone, in a period of less than 2 years, of several millions of dollars, every dollar of which millions was in the custody of the man (Commissioner Shields) named as custodian. Yet this practical exemplification is not sufficient to show, let alone prove, to the ignorant and to the knave—heaven help all of those in the grades between these two classes—that a decreased gas rate means a lower cost for equal volumes of gas used in the respective periods during which it was used. It was hoped that the New York proof would, even at the tremendous cost and loss to the Companies which it involved, stand for a score of years at least; but the hope was as diaphanous as is the honesty of those who are at the back of the present movement to prove that gas reductions are shams and snares. Ever since the Public Service Commission for this District became a created bureau its members have been pelted with complaints from many quarters that the bills for gas are higher than those submitted at any time in the past. In a great many cases this is undoubtedly true, and the reality results, also undoubtedly, from the greater use of gas, now that its cost has been so greatly reduced. This time, however, the "kickers" are playing another old long suit of theirs—the pressure claim being the best bower thereof. It is gravely stated to the Commissioners that the Company puts, at times, the entire pressure of its holders on the mains. Beyond a doubt, such is the case; the full pressure is absolutely necessary at times in the evening. But what of that? The Company could put its maximum on during the 24 hours, yet the simplest, "ordinariest" gas user, in the lowest level in the Water street swamp district, could laugh at the great Consolidated Company in so far as any attempt of theirs to increase unduly his use was exerted. Right at the base of his burner is the burner tap; and the only engineering skill (or other vital force necessary for him to exert) requisite to overcome the plottings of the Cortelyou-Addicks-Bradley combination, would be to shut off the flow until all sputtering ceased. To come back, however, to the specific instance before the Commission for the Metropolitan district. The Commissioners, feeling they could not ignore the multiplicity of complaints, have determined to make a thorough investigation of the pressure conditions existing in the district, and to the end that the investigation shall be conducted along unimpeachable lines, they have instructed the physical investigation to be outlined and conducted under the direction of Mr. W. A. Baehr, whose authority as a competent planner and carrier out of gas distribution—whether high or low service—is undisputed, and whose integrity is as unimpeachable as his engineering capability is unchallengeable. The Commissioners are to be congratulated over the eminently fair way in which they have handled the preliminaries of their disagreeable task.

FEBRUARY MEETING, NEW YORK SECTION, ILLUMINATING ENGINEERING SOCIETY.—Attendance records were perhaps broken, and at least those for conviviality were, at the February meeting of the New York Section Illuminating Engineering, which was preceded by a beefsteak dinner at the "Castle Cave," 7th avenue and 26th street, New York, on the 9th inst. There were nearly 90 members and guests present, and the dinner was so much enjoyed that the hour for business was rather later than usual. Dr. A. H. Elliott, the chairman, introduced Mr. Henry Hornbostel, who spoke briefly upon "Light and Architecture," his theme being mainly the marvellous developments which we have witnessed in artificial light sources. He told, in an amusing vein, of the architect's troubles, the last being the lighting man who wanted efficiency. Referring to the lighting of the Soldiers' Memorial Building, at Pittsburgh, he said that the effect of the colored lights was inspired by the lights along Broadway, and he further suggested that in the future we could expect the chandelier and bracket fixture to become unnecessary. Mr. Don Barber followed with suggestions for the future in the advancement of modern progress in lighting and in other things. He stated that the public does not realize the great magnitude of these modern improvements, taking many things for granted. For instance, the removal of an office building 10 years old, costing 4 to 5 millions of dollars, and replacing it with one twice as large, and similarly a railroad station of equal value, but still newer. What was true of these things was true of lighting, and we must look ahead into the future and endeavor to plan for a more lasting structure and equipment. Mr. Bassett Jones showed plainly the importance of good lighting by the fact that buildings and their decorations, both interior and exterior, are seen only by light and not in darkness, and that the artificial light must be provided to enhance rather than mar their beauty. It is the duty of the architect to conceive, and of the illuminating engineer to provide, this requisite illumination. Others entering the discussion were: Messrs. Moore, Lansingh, Holden and Voorhees.

CURRENT MENTION—

THE annual meeting of the Allentown (Pa.) Gas Company Employees' Club resulted in the election of the following officers: President, James Brown; Vice President, C. S. Phillips; Secretary, Miss Clara Miller; Committee on Papers, Herbert Conrad, A. P. M. Fegley, W. S. Watchuis, Lloyd Schaffer and Randolph White. The meetings of the Club are held monthly, and much good has resulted from the communings so far recorded.

THE City Gas Company, of Los Angeles, Cal., has petitioned the Superior Court for a voluntary dissolution of the corporation, and from the papers submitted it is shown that no valid claims are extant against it.

Publications.

Consolidated Gas, Electric Light and Power Company, of Baltimore, Md.—Pamphlet, 7 by 10, in 52 pp. Describing the Company's properties and plant.

Many flattering things have been said concerning the Lighting Company at Baltimore, Md., and the pamphlet recently issued will call forth many more compliments; for, aside from its interesting contents, it is a work of art.

The Company's properties are fully illustrated, and the various systems of manufacture and distribution described in detail. It is to be hoped that Manager Cohn has a generous supply of the pamphlet, as the requests for copies are likely to be many.

Annual Report, Secretary of Commerce and Labor, 1910.—The Eighth Annual Report of this Department, 6 by 9 inches, pp. 100. Government Printing Office.

The report covers work done in the office of the Secretary, the Division of Publication and the following Bureaus: Census, Immigration and Naturalization, Corporations, Labor, Manufactures, Statistics, Standards, Fisheries, Light House Service, Coast and Geodetic Survey, Navigation and Steamboat Inspection Service.

Rensselaer Polytechnic Institute Bulletin.—December, 1910; 5½ by 8 inches; 76 pp. Illustrated booklet containing description of mechanical, electrical, physical, chemical and material testing laboratories.

Welsbach Junior Light.—Pamphlet, 3½ by 6½ inches, 12 pp., in colors. Welsbach Company, Gloucester, N. J.

Attractive pamphlet entitled "The Biggest Little Light in the World."

Winnipeg, Canada.—Pamphlet, 5 by 7, 36 pp. The Winnipeg Development and Industrial Bureau.

Pamphlet is entitled "The Corner Posts of a Great City," and literal acceptance would indicate that they were ugly and of wood, to judge from the photos.

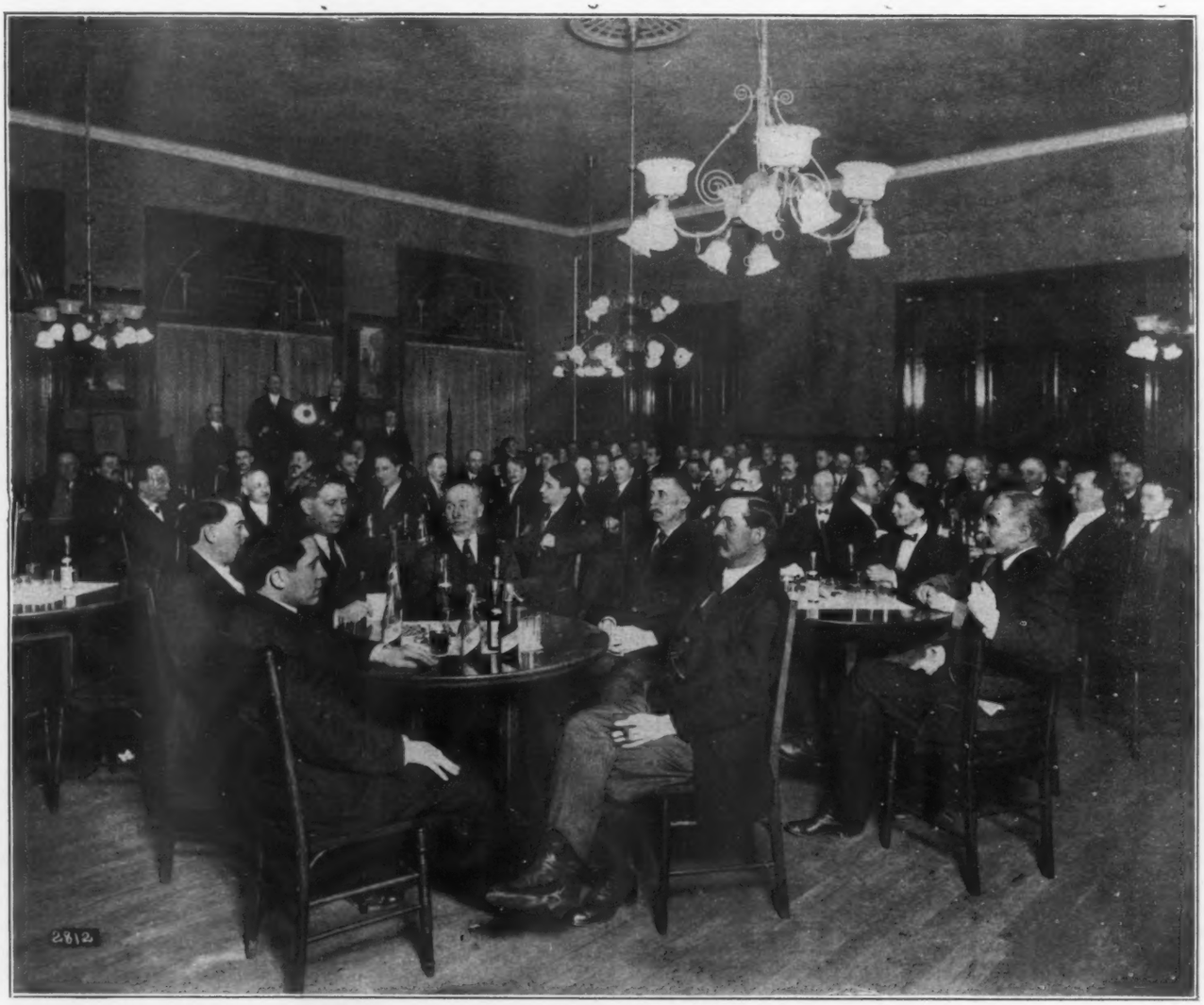
Ventilation in its Relation to Health.—Reprint of paper, by W. G. Snow; 6 by 9 inches, 23 pp. Issued gratis by The Warren-Webster Co., Camden, N. J. To be reviewed in a later issue.

Valves.—Catalogue Ludlow Valve and Manufacturing Company, Troy, N. Y.; 6 by 9, 170 pp.

Fully illustrated catalogue of the "Ludlow" goods, with much data covering sizes, dimensions, etc.

Bonds.—Pamphlet. "The most satisfactory bonds," issued by N.W. Halsey & Co., New York City; 6 by 9, 40 pp.

An attractively clothed appeal for corporation bonds as a medium of investment, with charts showing earnings, etc.



Meeting of the Indianapolis Branch of the International Stewards' Association, Indianapolis, January 31st, 1911.

MEETING OF INDIANAPOLIS BRANCH, INTERNATIONAL STEWARDS' ASSOCIATION.

The hotel and restaurant proprietors, chefs and stewards of Indianapolis, Ind., affiliated with the International Stewards' Association, met at the German House, Indianapolis, January 31st, to transact a business and social session.

The President, Mr. J. Edward Krause, proprietor of the Hotel Edward and the Hotel Morton, Indianapolis, presided. He was flanked on the platform by Mr. George W. June, Secretary of the Indianapolis Association and a prominent member of the National Trades School Board.

The business part of the meeting was interspersed with orchestral musical selections, and refreshments were served during the evening. The whole proceedings were enlivened with that conviviality and heartiness of sociability which are characteristic of hotel men the world over.

Following the address of the President, the meeting was opened with an exceedingly interesting address by H. E. Barnard, B.S., State Food and Drug Commissioner and Chief of the Division of Chemistry in the Department of Health in the State of Indiana. His subject was on "Cold Storage and Its Effects. The famous Professor declared the public had an erroneous idea of the effect cold storage had on food products and showed the advantages of cold storage under proper regulation and sanitary conditions. He discussed and explained the bill, now before Congress, "To provide for the marking or labeling of food containers manufactured or sold for use in the United States—or in any Territory thereof—or in the District of Columbia, so as to show the net capacity and the net weight, or the net measure, of the contents thereof." He strongly favored the bill for the fixing of a time limit for products to remain in cold storage, stating that for 6 months cold storage had no injurious effects upon food products, but that between 6 and 9 months there was a slight chemical deterioration, rendering it advisable to place the time limit at 9 months. He claimed that this law would practically eliminate the disadvantages and abuses of the cold storage system.

Mr. Isador Wulfson spoke enthusiastically on the topic of the "Violation of the Weights and Measure Laws," showing to what extent dishonesty is practiced and the subterfuges and methods adopted to escape the law.

"Domestic Science" was the subject of a paper by Mr. George Nedtweg, Superintendent of the German House, Indianapolis, in which he dealt in masterly way with the servant problem.

Mr. George W. June, of the well known firm of June Brothers, restaurant proprietors, Indianapolis, who claims to be one of the first restaurant men in this country to cook steaks with gas, dealt with the topic of the "National Trades School of Indianapolis." This subject was to have been treated by the Hon. Chas. A. Bookwalter, ex-Mayor of Indianapolis, who was, however, unavoidably absent. Mr. June fully and clearly explained the scope and purposes of the proposed "National Trades' School" for the training and education of chefs, cooks, waiters, etc., which it was proposed to establish in Indianapolis. He reported that $137,000 of the amount required for the erection of the building had already been subscribed. This National Trades' School (the only one of its kind in the world) is to be equipped with all the latest and most improved gas ranges, ovens, carving tables, chafing dishes, and all the other gas appliances used in hotels restaurants and club grill rooms and kitchens. Prints were exhibited and passed around the hall, showing the magnificent $200,000 building which it was hoped would soon be begun in Indianapolis.

The President read the official appointment of Mr. Philmer Eves to represent the National Commercial Gas Association, and called on him for his paper on

WASTEFUL WAYS OF USING GAS IN HOTEL, CLUB AND RESTAURANT KITCHENS AND THE REMEDY,

which Mr. Eves read as follows:

It is indeed an appreciated pleasure and an honor to be invited to address your Association and to officially represent the National Commercial Gas Association on this occasion.

Our subject deals with an important question, which has hitherto been considered more or less in a casual manner, and generally by those who have been interested in their own local and individual problems. It has been truly stated that economy is the mainspring of business, since success and wealth are dependent upon business profits. Economy of men's labor, economy of time and economy in handling raw materials, out of which the salable commodities have to be evolved, occupy the attention of all successful men of business. One other important source of profit or revenue might well be placed in the category of business economy and which it would be well to carefully consider. Under this latter head is placed the profit-and-loss in the handling of appliances which assists in producing the finished product.

A fine illustration of the value of this economic proposition is offered in the statement of a famous manufacturer of mustard, who, when jokingly told that he had made an enormous fortune out of the mustard which the public had consumed, corrected the mistake, put the joke on the other fellow and taught a valuable lesson by showing that most of his wealth had been accumulated by the mustard which the people left on their plates. The waste here was a source of income to the mustard maker and a corresponding loss to those who had paid for the mustard. Since this argument may, to a large extent, be admitted as good reasoning, it would sound somewhat anomalous if it could be shown that the mustard manufacturer had spent some of his earnings to show where his own revenues could be cut down and the buyers' profits increased by devising ways and means of curtailing the extravagance. This is exactly the position of the manufacturer and seller of gas, although the statement is sometimes received with a grain of mustard, or salt. It may, therefore, need some preliminary and convincing announcement before the gas companies' *bona fides*, "the business motive," can be accepted and fully appreciated. The topic which we are to consider with your Association is the increase of economy or profits to the buyer of gas; or, in other words, the methods which the seller of the gas can suggest to cut down his own output of the product. To clear away the apparent incredibility of the statement, that the interest of the gas company is augmented by advocating economical methods of consumption, we would at once state that there is in this country not a single gas company which is not alive to the fact that in the enlarging arena of competition it must use every honest means to maintain and extend the sales of gas by popularizing its use and showing its many advantages. This extension is the legitimate aim of the business, because the gas companies, like all other merchants, are in business to make money. The success of the business is absolutely dependent on the successful and economical use of gas by the consumers. "A satisfied consumer is the best advertisement; a dissatisfied patron is the poisonous weed that kills the harvest; to sell an article to one careless in its handling is to have the article condemned and its use discontinued." There are many of these quotations or business sentiments which could be given, notwithstanding the curious fact that it is stated "there is no sentiment in business." If the words "business policy" be substituted for "sentiment," the idea will be more generally understood and accepted.

Admitting, then, that there is something to be gained from the knowledge of economies, and that these economies have been, and are being, taught and demonstrated as part of business policy, it will be at once seen that your representatives took a very wise step in the right direction and had the interest of the Association at heart when they set aside these few moments for a consideration of the subject of gas appliance management. The importance of the topic is emphasized when it is remembered that the tendency of the present age is to build up hotel, restaurant and club kitchens with modern apparatus which improve hygienic conditions, save time and labor, afford more comfortable surroundings to the workers, lessen fatigue, and produce more goods. This question is further broadened by the fact that if we consider the United States as a whole, and not merely our own circumscribed area, the unequal distribution of coal becomes to many a very important factor in the question. The greater part of the territory either has no fuel at all or little, and that of poor quality from the calorific or heat-giving point of view. Wood has been practically eliminated from the question by the rapacious wastefulness of the last quarter century, and has long been discarded, from an economical point of view. Gas is becoming more generally adopted in these large kitchens, and the manufacturers report an increase of over 50 per cent. in the output of hotel and restaurant appliances over any previous period.

On the other hand, it is well known that the comparatively small matter of economy in the manipulation of cooking appliances has been deemed by the larger concerns unworthy the time necessary for its consideration and practice. Such are the large interests involved in the great hotels, restaurants and clubs of the present day, that the very magnitude of these interests, coupled with the demand and willing expenditures of an opulent patronage, crushes this detail of economy, for which the word "parsimony" has sometimes been substituted, entirely out of the category of matters of common concern. The rapid evolution of this great business, from the primitive hostelries of only a few years ago to the palatial hotels of the present day, has indeed been one of the remarkable features of our own time. Thirty of the hotels of New York alone represent a value of nearly $87,000,000, exclusive of the furnishings. In Chicago and other large cities the same sumptuous supply meets the demands of the resident and travelling representatives of almost every race of people on the earth whose ideas and tastes differ and must be gratified. In these modern palaces, however, there is now one attraction featured, which, in the earlier days, was never considered as an asset of the business. It is the feature of the up-to-date gas kitchen, "Where the high salaried chef has full sway, and where, under the most improved hygienic surroundings, his latest and most palatable creations are delicately constructed by capable assistants. Dust from ashes and coal, that in olden times often spoiled the best laid plans of the cooks of those days, are not factors to be feared now; neither is the kitchen furniture begrimed nor the walls and ceilings blackened; the coal piles and ash heaps are miles away, but the product of the coal—gas—is at the cook's hands, to be used when required and turned off when not needed." Yet in many of these large concerns of to-day, where the small daily waste may cost thousands of dollars in a year, it is now realized more than ever that it pays well to know the economies that could be easily understood and so advantageously practiced, in the manipulation of kitchen gas appliances. This is all the more desirable and all the more profitable when it is found that the economy has the additional advantage of increasing and holding the patronage. This is simply the effect of the superior quality of cooking owing to perfect conditions, and it is these perfect conditions which the chefs of to-day endeavor to preserve in their kitchens. In a recipe by a famous New York chef it is carefully stipulated that certain work must be done "with the gas jet half open, with a nice, blue flame; this will produce a nice coloring." It is well known by an expert in the use of gas as a fuel that two conditions tend to lower the standard of cooking and increase its cost. The first is a faulty appliance, in which an imperfect combustion of the gas and an uneven circulation of the heat units of the gas produce equally faulty results at comparatively large operating expense. The other adverse condition is the imperfectly adjusted burner, which prolongs the operation, diminishes the quality of the work, demands a large quantity of fuel and converts the utensils into extravagant confederates of the wasteful burner.

Regarding these cooking appliances, it may not be generally known that the American Gas Institute has taken official steps towards the standardization of cooking appliances, and has spent immense labor and much expert knowledge in formulating gas appliance specifications. The question of perfect combustion has been thoroughly and scientifically gone into. Bunsen, the famous German Professor of chemistry, whose name was given to the burner he invented, applied these laws of combustion, and, by admitting the proper amount of atmospheric oxygen in the burner before combustion, limiting it to such an amount that it would consume part of the carbon in the gas to be consumed, gave us the atmospheric burner with its perfect combustion. Perfect combustion is formed when the proper gases are mixed in proper proportions.

Ordinary artificial gas requires approximately 6 parts of air to 1 part of gas to complete combustion. Too little air leaves a white tip on the flame; too much causes a popping down in the Bunsen tube or burner. The mixer shield is, therefore, so arranged that the port holes may be slightly opened or closed until the exact consistency of

blue flame is secured. The white tip, if allowed, will do four things. It will lower the temperature of the flame; it will correspondingly slow down the process of cooking; it will gradually but surely carbonize or blacken the cooking vessels; and it will necessarily increase the operation cost. When the carbon particles become attached to any cooking vessel they not only soil the vessel, but act as a non-conductor of the heat, preventing the heat units of the gas from getting to the contents of the vessel. From one of the hospitals of this city there came a report to the Indianapolis Gas Company that the sterilizing apparatus was out of order. It was stated that, when new, this apparatus could be completely heated in 20 minutes, but from some unknown cause the time required had been gradually extended to over an hour. A moment's inspection showed that the air mixers were not properly adjusted and that the white tips of the flame had completely covered the underside of the tanks with soot. The loss to the Institution in time and gas, and the inopportune inconvenience, can hardly be estimated. An earlier report would have prevented this loss, which was stopped in 5 minutes by cleaning off the accumulated black particles and opening up the air ports. The same waste, in a larger or smaller degree, will happen with any gas appliance, but need not occur and does not occur where ordinary care is taken to preserve the right conditions. The marked contrast in this respect, as seen in hotels and private kitchens, shows that very many people now understand these principles, while there are others who entirely neglect them, or are indifferent to their full economic value. In the series of lessons in domestic science, given gratuitously during a number of years by the Indianapolis Gas Company to the nurses of the various hospitals of Indianapolis, this subject of a cleanly and economical gas flame was fully dealt with and explained, so that each nurse could readily adjust the burner flame of a gas range wherever and whenever these adverse conditions were found. In this co-operation with the hospital kitchen work many articles of diet suitable for the sick were demonstrated. Mrs. Helen Armstrong, who has lectured extensively at the University of Wisconsin and also for the Indianapolis Gas Company in this city, and for many other gas companies of the country, in speaking of the nourishing soups and broths made possible by long steady heat, and where much nutriment is lost when a very low temperature is not maintained, points out that some cooks feel that nothing can be accomplished unless a red hot stove is in evidence. The same high authority, as well as other expert teachers in this field, are responsible for many of the economies which may be found in the management of gas range ovens. The variety of dishes which can be cooked at one time, providing there is careful management, very naturally reduces the cost of operation and does away with odors which are noticeable if cooking is done on the top of the range. The gas oven is sadly neglected in this respect. It is now well known that many of the vegetables and cereals, which have previously been brought to the boil on top of the range, can be placed in any of the ovens which are being only partially used; in other words, much of the oven heat generated is often wasted when it could be advantageously utilized in this way. It is well known that in any boiling operations it is impossible to get a higher temperature than 212°, the boiling point of water. The most intense and extravagent gas flame will fail to produce a higher temperature even if it were needed, while the small simmering burner, burning from one-sixth to one-tenth the quantity of gas, is sufficient to maintain the boiling or simmering condition. Even chefs and cooks, who understand professionally the principles and advantages of simmering and who will know that, in boiling meats and preparing soups, even a boiling temperature is often disastrous to good results, keep the larger burner at its wasteful work instead of removing the kettle to the simmering burners provided for this very economical service.

Perhaps the most costly mistake in the majority of large kitchens is in allowing the burners to remain on at "full blast" when not in use, and in using cooking vessels that fail to spread far enough out over the flame used, allowing the flame to lap up on the sides of the vessel. This mistake will readily be comprehended when it is seen that in some cases only about 50 per cent of the heat generated from the burner is applied directly to the contents of the vessel, the other 50 per cent. being radiated into the kitchen and wasted. The value of economical cooking vessels with wider base has been recognized by the utensil manufacturers. The blame, therefore, lies with the hotel and restaurant proprietors in not taking advantage of the pans and kettles that would give greater economy and do equally satisfactory work in less time. "Matches are cheaper than gas," and every large kitchen should have this motto on its walls as a constant reminder to the cooks.

Much unnecessary and detrimental waste is occasioned by the lack of proper handling of the gas flame in baking operations. It is so very seldom realized that, after the proper oven temperature has been secured as quickly as possible, by the full power of the burners provided for the purpose, the even temperature desired may be maintained by shutting off more than half of the flame. Even where this lowering of the fire is remembered, in the interest of successful work, it is seldom that the operator thinks to close off the gas entirely to accomplish "browning." The heat left in the ovens, by slowly diminishing when turned off, will produce a much richer crust, prevent scorching and save the gas.

In many of the clubs and hotel grill rooms, where the chefs in snow white attire and in full view of the patrons turn out the juicy order from the broiler, it is almost an invariable rule to burn the gas continually at the full during the hours of demand. If this demand is incessant the burning is justified, but when intervals occur the broiler may be kept hot and ready with one-third of gas.

Where plate warmers are heated by steam, with gas as an auxiliary, with its handy fire always on tap, there is often too high a temperature maintained. Plates should never chill the food, but they need not blister the hands of the waiters.

Gas used under the carving or serving tables is an economy, because all the heat can be applied direct to the heating tank, but it is not necessary to use more than one-tenth of the burner power to maintain the desired temperature when once obtained.

It is an unaccountable fact that the economy of the upright broiler, especially when arranged in batteries, is not more generally recognized in some parts of the country than it is. The saving of time by broiling the two sides at once, the prevention of loss of the juicy nutriment of the meat by quick searing, and the retention of the heat with a much lower gas flame than with the horizontal broiler, are points which perhaps have been unintentionally overlooked.

The one gas appliance that seems to be made to respond to a more economical use is the griddle, which is seldom allowed to become so far overheated as to brown or burn the cakes before they are properly baked, yet a griddle burner is frequently allowed to become faulty and to deposit the heat-robbing carbon underneath the griddle surface. An occasional investigation of the condition of the interior of the griddle is all that is necessary to prevent waste or loss of time in this kind of baking.

The newer styles of bake ovens, having the series of several ovens heated by circulation from the one set of burners, are an advance along the lines of economy. These ovens are an advantage where continuous baking is required, as the heat once generated can be economically maintained. This continuous baking, however, interferes somewhat with the economy gained where all the gas can be turned off during the process of browning the crust. The heat is not turned off because it is needed for another waiting batch of baking.

Some years ago the Gas Company which we have the honor to represent began a systematic plan of giving instruction in the proper management of gas appliances. This instruction or education department has done a successful work, and its efforts in this right direction have been appreciated everywhere. Free cooking lessons, demonstrations and lectures have been given at many of the churches, schools, public halls, hospitals and public institutions of the city of Indianapolis. Free instruction has also been given at the home or place of business of every purchaser of a gas range or other kitchen appliance. No gas appliance is ever sent out unaccompanied by these valuable instructions on the saving of time, labor and gas. Gas companies throughout the country are adopting these methods of disseminating this expert information, resulting in a far more efficient and economical handling of gas appliances now than formerly.

We would very respectfully take this opportunity to reiterate the advantages and economies that would accrue to the public schools, to the domestic science classes of the country, to the hotels, restaurants, clubs, hospitals, factories, etc., where large gas kitchens are operated, if there were a more general co-operation with the local gas companies. The suggestion might also be accepted by the various educational authorities, on the basis of mutuality of interests, that there be a more systematic instruction given in the proper manipulation of gas to the students of the colleges, technical institutes and public schools. The assistance of the gas companies' experts is always available for this co-operative and very helpful work. Since these interests are mutual, and the gain is on the side of the gas consumer, it is found

that gas users throughout the country are now more alive than before to the benefits to be derived from this co-operation and from a more careful study of these economic problems. At the annual meetings of the National Commercial Gas Association exhibits of improved gas appliances are a means of informing those who are responsible for this instruction work in the latest discoveries of appliances and methods for securing additional efficiency and economy. The exhibits in Chicago, New York and Boston, when the immense exhibition buildings were completely filled with the very latest apparatus, were open to the general public. These exhibits have publicly declared the desire and policy of all gas companies to give the very best of economical service to their patrons. The advice and assistance of all gas companies are freely and respectfully tendered to your Association and to all others who are concerned in these valuable economies.

In the name of The National Commercial Gas Association, of Mr. Carl H. Graf, the Vice-President and General Manager of The Indianapolis Gas Company, and for myself personally, I thank you for this privilege and for the honor of meeting with you to-night.

Notes on Illuminating Engineering in Great Britain.

[By a London Correspondent.]

Quite a number of papers dealing with various aspects of lighting and illuminating engineering have recently been delivered in Great Britain, and the interest in such matters is evidently growing.

The Illuminating Engineering Society, in London, has now commenced its second session, the President for the second year being again Prof. S. P. Thompson. The opening meeting was held November 9th, 1910, the main feature on this occasion being the delivery of a paper on "Recent Advances in and the Present Status of Gas Lighting," by Mr. F. W. Goodenough. An interesting communication was also read by the Hon. Secretary regarding the work of the Society during the vacation.

Factory Industrial Lighting.—One important item had been the presence of two delegates at the International Congress of Industrial Hygiene held in Brussels last September. This Congress received very influential Governmental support, over 600 delegates from different countries being present and more than 100 papers presented. The importance of the occasion, from the illuminating engineering standpoint, consisted in the recognition on the part of the medical and sanitary authorities of the claims of good illumination. Several papers on factory lighting and the effect of light on the eye were read, including one by Mr. L. Gaster, Hon. Secretary of the Illuminating Engineering Society. One question considered by the Congress was the possibility of specifying a minimum illumination to be provided for different classes of work. Special stress was also laid on the value of good illumination as a means of reducing accidents. Many casualities occur through the illumination being insufficient. For example, a workman will readily allow a portion of his anatomy to stray into moving machinery if the surroundings are badly illuminated so that he cannot see what he is doing. Indirectly, too, bad lighting leads to breakdowns of machinery, because a badly lighted plant is rarely properly cared for and cleaned.

Nowadays this is becoming pretty well recognized; but another factor in accidents, the effect of the glare of exposed lights, has not yet received enough attention. The wise direction of light where it is needed is quite as important as the quantity. Thus a bright light in the range of vision may dazzle a workman and so lead him to fall into the very mistake it is intended to avoid. In the same way, if the shadow is cast in the wrong way (as to obscure the action of a cutting tool in a tailoring department, for example), not only will there be more misfits, but there is a risk of the operator getting his finger in the tool. In view of such considerations as these the Commission placed special emphasis on the *adequate lighting*, besides proper guarding of dangerous machinery. The Home Office had also recently been much interested in the question, especially with regard to the lighting of underground premises, where unsanitary conditions are apt to prevail. Good illumination and plenty of light are great foes to consumption and pulmonary diseases. Also, where dangerous processes are carried on, and neglect of cleanliness may have serious consequences, proper lighting is again most important.

The above are a few of the questions in connection with industrial lighting which the Illuminating Engineering Society has been instrumental in bringing to the notice of the authorities.

A New Type of Non-Adjustable Gas Burner.—The account of this work was followed by a paper by Mr. F. W. Goodenough on "The Present Status and Recent Advances in Gas Lighting," which has received a considerable amount of notice, both in Great Britain and also in the United States, and on which, therefore, nothing additional need be said here. It is worth mentioning, however, that one point, raised by Mr. C. Carpenter, of the South Metropolitan Gas Company, in London, deserves special notice. The announcement referred to a new form of burner now being utilized by the London Gas Companies. It has long been recognized that a burner which is adjusted to the quality of gas in one locality may not answer in another, and in the past it has sometimes happened that burners of which great things were expected did lead to admirable results in some districts, but proved most disappointing in others. It was, therefore, looked upon as necessary to provide special air and gas adjustment with each burner, although it was recognized that this had the drawback that the unskillful consumer might not adjust his burner well and might, therefore, get very poor results from his lighting. In some cases types of burners have even been equipped with thermostatic control by aid of which the proportions of gas and air were claimed to be automatically regulated to the best advantage.

Now a great simplification seems to be brought about by a type of burner introduced by the South Metropolitan Gas Company. It should be explained that somewhat unusual conditions prevail in London, the greater part of the city being lighted by two large companies, the South Metropolitan and The Gas Light and Coke. It is, therefore, possible to secure a very uniform quality of gas, and any burner which is acceptable these Companies can be very widely used.

Now the new burner mentioned by Mr. Carpenter is adjusted once and for all for the quality of gas for which it is intended; after that no regulating is needed or desirable, and there is nothing left for the consumer to do in this respect. The burner, therefore, leads to a great simplicity, since, for a given quality of gas, the consumer should automatically receive the benefit of the best conditions. The burner is stated to have been successfully tried for some months by the two companies mentioned, and no doubt it will find application in other quarters, being, of course, correctly adjusted to the local requirements in each case.

Library Lighting.—The second meeting of the Illuminating Engineering Society was given up to a corresponding paper on "Recent Progress in Electric Lighting," by Prof. Marchant, of Liverpool University. The Society has thus dealt impartially with recent developments in both the great methods of lighting and is now turning its attention to the applications of both. The last meeting was given up to a discussion on library lighting. Here, again, the idea of co-operation was prominent. The meeting was organized with the co-operation of the Library Association, and it was arranged that the librarians should first express their view of what good library lighting consisted, and the engineers should subsequently suggest how these conditions might be improved or secured.

The two first papers, by Mr. Jast (Croydon Public Libraries) and Mr. J. Duff Brown (Islington Public Libraries), covered the ground for the librarians in a general manner. One of the great points discussed was the question of the relative merits of local and general lighting, the predominant view among the speakers being apparently that a combination of the two systems was the ideal method. An interesting distinction was drawn between "reading rooms," where people merely drop in to read the newspapepers and periodicals, and "reference rooms," intended rather for students. In the former case one desires bright and cheerful surroundings and, therefore, walls that are light in texture are utilized. In the second case subdued surroundings and local lighting by table lamps are almost invariably preferred, because this arrangement naturally helps the reader to concentrate his attention on his work and gives the necessary impression of repose. A very difficult problem by which librarians are met is the proper lighting of shelves. Special methods are necessary to secure approximately even illumination and to avoid the direct, shiny reflection off the backs of the books, as this prevents their titles being read with comfort. As regards the intensity of illumination needed for shelf-lighting, a distinction has to be drawn between the shelves in *reference libraries*, and in rooms in which the librarian has to select particular volumes in a tolerably leisurely manner, and *lending libraries*, where a number of people are simultaneously scanning the shelves and anxious to find what they want quickly. An interesting novelty in one library was the use of specially illuminated index names and headings; these "stood out" and were of assistance in making it clear at once where the different classes of books were stored. All these points were of keen interest to the librarians in London, where public libraries abound, partly as a result of the munificence of Mr. Andrew Carnegie.

One other item of interest was the collection of results of measurements of illumination data and other details in well known libraries, submitted by Mr. J. S. Dow. It was pointed out that, according to some authorities, 5 foot candles was a desirable illumination to attain; according to others, 3 to 4 foot candles was considered ample. The old minimum of 1 foot candle was now considered insufficient. The average illumination in very many London libraries was about 2 foot candles. The illumination on the shelves, however, seemed to vary very greatly indeed, and it was difficult to draw any conclusion as to the standard at present considered necessary. Some useful comparisons between different libraries could be made, in some cases a higher consumption of electricity per square foot was attained than in others, and yet the available illumination in these cases was less. Mr. L. Gaster referred to the Carnegie libraries in New York as an illustration of the working together of the architect and the engineer to secure good illumination, very great pains having been taken with the choice and arrangement of the fixtures employed. He also referred to the method of suspending chandeliers over the gangways in certain London libraries; however pleasing the effect might be to the architect, the illumination on the central tables in some of these cases was not nearly enough.

A Standard Specification.—A very important announcement recently made by the President of the Illuminating Engineering Society was that a committee would be appointed by the Society to deal with the question of a specification for street lighting. This is a subject that has been exciting much comment during the last two years in England. A notable incident was the appointing of a deputation of the city of London to visit Continental cities with a view to getting information on the best modern means of street lighting. Subsequently there has been great competition in certain localities between gas and electric lighting—notably in Westminster—where high pressure inverted gas lamps were eventually introduced in place of electric arcs. The specification involved in the contract on this occasion was in some respects a new departure, since it was framed on the basis of the supply of a certain candle power of the lamps, and it was prescribed that the candle power should be tested as the mean of reading as 20° and 50° to the horizontal. This value has been stated to correspond closely with the mean horizontal candle power of most lamps, but there has been some disagreement on this point.

There appears to be a gaining impression among both electrical and gas representatives that a form of specification which would be acceptable to both parties would be very desirable and would stimulate street lighting on the proper lines. The moment is, therefore, opportune for an attempt to bring together the different parties interested, and the Illuminating Engineering Society, with its international and impartial attitude, will doubtless do much to bring about the desired condition of affairs.

Street Lighting and Glare.—Another factor in street lighting that has been much discussed is the influence of glare. But a few years ago all discussion on street lighting was confined to data regarding the uniformity of illumination on the pavement. It was apparently considered that if a high illumination on the pavement could be secured, and free from "spottiness," one had done all that could be expected in the way of securing good street lighting conditions.

Now more recently the idea has been gaining ground that this is not enough. The other great condition to be met is *absence of glare.* At present the crude methods of arranging lamps often defeat their object. The presence of these bright specks causes the pupil of the eye to contract and the retina to adjust itself to the brilliancy, with the result that other moderately illuminated objects appear dark in comparison and the "seeing power" of the eye is sacrificed in order to secure high illumination. One point that has been much dwelt upon in discussions in England, before the Institution of Electrical Engineers and elsewhere, is the changing condition of traffic. The development of motor vehicles and speeding-up of traffic have been going on very rapidly in London, and this has not only served to show the need for strong illumination, but has also brought into prominence the effects of glare, several recent accidents being attributed to drivers or pedestrians being dazzled by lights in the direct range of sight.

But the problem is how to meet both conditions. At present it is often just those rays which are effectual in illuminating the parts of a street most remote from a lamp which cause glare. One possibility is the more scientific use of diffusing and distributing globes and reflectors with street lamps. Hitherto the general impression seems to have been that while it was needful to screen indoor lights this could not conveniently be done in the streets. But more recently opinion seems to have been changing on this point and quite a number of diffusing and reflecting devices have been experimented with recently.

Another possibility of improving exis ting conditions is to raise the standard of general "local" lighting, through advertisement signs, etc., in the streets, for it is recognized that glare is largely a matter of contrast, bright lights against black backgrounds. Most of our modern lamps would not appear nearly so brilliant if seen amid brighter surroundings. Therefore, the encouragement of mildly luminous signs, or the direction of light on the exteriors of buildings, so as to reveal their architectural features, decorative lighting, and other means of raising the general brightness of surroundings, are desirable, and as the value of light for advertising and decorative purposes comes to be better appreciated, we may expect to see a marked development in this direction.

[Official Report—As Approved by Committee on Publication.—Continued from Page 254.]

THE FIFTH ANNUAL MEETING, AMERICAN GAS INSTITUTE.

Held in New York City, October 19th to 21st (Inclusive), 1910.

Second Day—Afternoon Session.

The President introduced Mr. V. L. Elbert, who read the following paper on the

CONSTRUCTION OF A REINFORCED CONCRETE TANK FOR A GASHOLDER.

Some 4 years ago we installed a reinforced concrete tank to contain a 4-lift gasholder. This tank differed from the ordinary pit tank to the extent that only an annular ring was excavated, the center or mound being left in tank. I believe I am not mistaken in stating it is the only one of its kind in this country and, therefore, believe a paper on the subject will be of interest to the members of this Institute and hope of some benefit to anyone having a similar proposition in mind. The dimensions of this tank are as follows: 96 feet 6 inches diameter, and 31 feet 2 inches deep, inside; 99 feet 2 inches diameter, outside, that is, the circumference walls were 16 inches thick. The number of column bases were 10, each base being 3 feet square, and they extended, from outside circumference wall, 1 foot 8 inches. The walk around top of tank was 2 feet 2 inches wide, and 6 inches thick. The annular ring when finished was 9 feet wide, inside. The mound was 78 feet 6 inches in diameter, and 20 feet high, or 11 feet 2 inches lower than the top of outer circumference wall. We decided on this style of tank instead of steel tank, as the foundation for a steel tank, with protection for same, would have cost quite as much as a complete concrete tank, on the site where we had to place it.

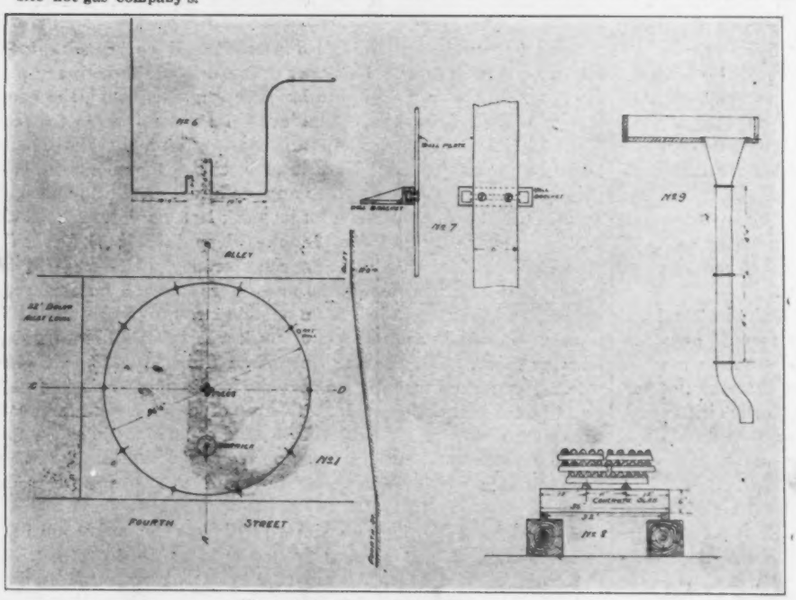
Site.—*Photo. No.* 1.—The site we had was the only one adjacent to our gas plant, was sloping, from the alley to 4th street, 11 feet. From east to west we were limited for room on account of an artesian well on the east for which we had use; on the west a deep hole, some 22 feet below alley level or top of tank. This site was originally an old marsh and had been used near west line for a city dump. water was encountered 16 feet below top of alley, which had to be kept out during the construction of the tank and holder.

Laying Out.—*Drawing No.* 1.—After clearing the property we at once laid out the center of tank and, with a transit, each of the center lines for the 10 columns, being particular to have 2 columns straddle the center line *A B* on north and south of property line. Our property from north to south was only 101 feet 4 inches, and the extreme diameter of the walk around on top of tank was 100 feet 10 inches, leaving 3 inches to spare on each side of the walk around to the property line. The center was a nail point in wooden block in end of a piece of gas pipe, driven into the ground about flush with the same, and an excavation around same filled with concrete, which held the pipe absolutely steady.

Sump Hole.—*Photo. No.* 2.—A sump hole was then started, 8 feet by 16 feet, on the southeast corner, about 6 feet from the outer circumference of tank, for the purpose of draining the water as the excavation progressed, and for one 24-inch outlet pipe. This hole was heavily timbered, with 2-inch by 8-inch, by 12-foot sheeting, sharpened chisel-shape on the lower end, with 6-inch by 8-inch for stringers and braces on upper 12 feet, and 8-inch by 8-inch timber on lower 12 feet; the lower 12 feet was driven inside of upper section.

Across the top of this hole, and a few feet above, a beam was placed, and from this a pulsometer hu ng from a chain block which was low-

Photo. No. 1.—Shows site for tank. Pile driver ready to start work. Tank center about where pile driver engine is shown. Hoisting engine for derrick to left is on 4th street. Building to right is purifying house. Building with staging is meter building just completed. Building on the left adjoining this site not gas company's.



Drawings Nos. 1, 6, 7, 8 and 9.

Photo. No. 2.—Shows sump hole started on outside of outer piling and some of the outer piling on the east and south driven. Excavation started.

ered as the hole was sunk to remove the water. Steam for the same was furnished from the gas works some 300 feet distant. This hole was sunk some 3 feet lower than the bottom of the drip pot, or 30 feet lower than 4th street. From the side and bottom of this hole a 12-inch sewer tile was laid to the center of the annular ring and connected to the drain to be described later. When tank was completed a shaft of concrete, 3 feet in diameter inside, was constructed in sump hole from the bottom to the ground level. Near the bottom the 12-inch tile drain entered this shaft. The top of shaft had a plank cover bolted on, which proved convenient to observe height of water to any time on outside of tank.

TRAM.—*Photo. No.* 3.—Four piles are driven around center nail point, two on line with derrick *A*, *B*, and two perpendicular on line *C D*, all being thoroughly braced at the bottom. The two on line *C D* being cut off 4 feet above mound; the two on line *A B* were left some 12 feet above the mound. The tram arm was 5 feet above the top of the finished tank. The details for tram show tram proper, only 35 feet long from center of shaft to outer end, an extension piece of wood ¾ inch by 3½ inches by 22 feet was made to slide through the end marked *X* as an extension piece, with holes through the side at stated intervals and a ¾-inch pin put through the holes at *J*, near end of tram and 7 feet towards center, to hold extension piece in place when extended beyond the end of tram. The main part of tram was made only 35 feet, in order to clear the inside piling some 12 feet above the mound.

DERRICK.—*Photo. No.* 3.—The derrick was the ordinary guyed type, having a mast high enough for the guy wires to clear tank sides to a height permitting the derrick boom to swing in most any position without interference and, with the exception on a line with the shaft of the tram, was available at any point of the circumference of tank, the boom being some 90 feet long.

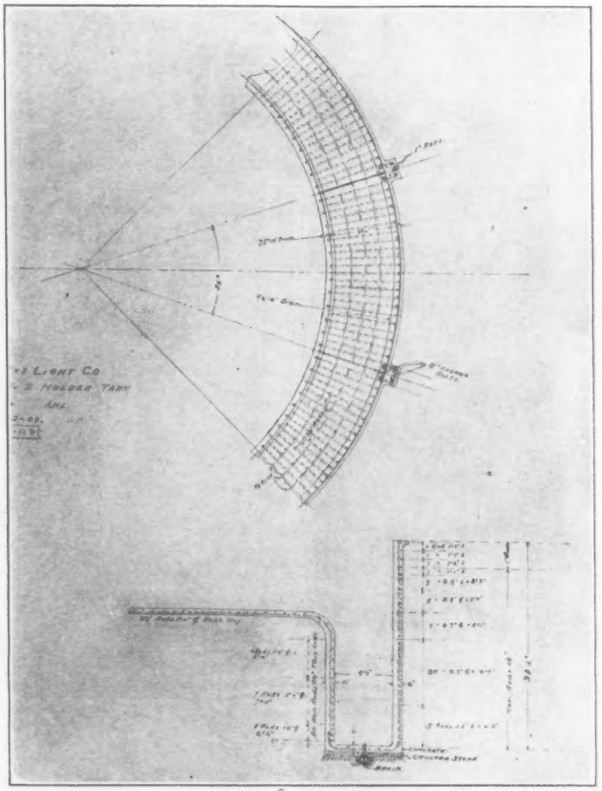
PILING.—*Photo. No.* 3.—In order to hold sheeting in place, as well as to carry a templet on top of the outside piling, which was used to hold vertical reinforcing rods in place and column anchor bolts, piles were driven on the outside of outer ring and inside of inner ring—four piling between each set of columns on outer circle and three[1] on inner circle. These were far enough back to allow two sets of sheeting to be placed, as the excavation below 4th street was 22 feet.

Piling should be heavy enough to drive the lower or small end several feet below the intended excavation, and strong enough to hold back the earth when sheeting was in place; in our case the tops were 12 inches to 14 inches, and 40 feet long; some 50 feet long were driven on the outer ring next to alley, where three sets of sheeting were required. As the excavation progressed braces were placed between the piling every 6 feet.

After both walls of tank were finished the piling was cut off a foot below the mound level and mound leveled up over them and tamped. On the outside ring they were cut off below grade of yard level; 47 pilings were used for constructing purposes only, and no piling whatever were driven under annular walls for foundation purposes.

SHEETING AND TIMBERING.—*Photo. No.* 4.—Sheeting was placed as the excavation of annular ring progressed, driven by hand labor with a maul, in the same manner as you would in ditching. The timber for stringers and braces being handled with the derrick and lowered into the ditch and placed by hand. Six-inch by 6-inch were used for stringers

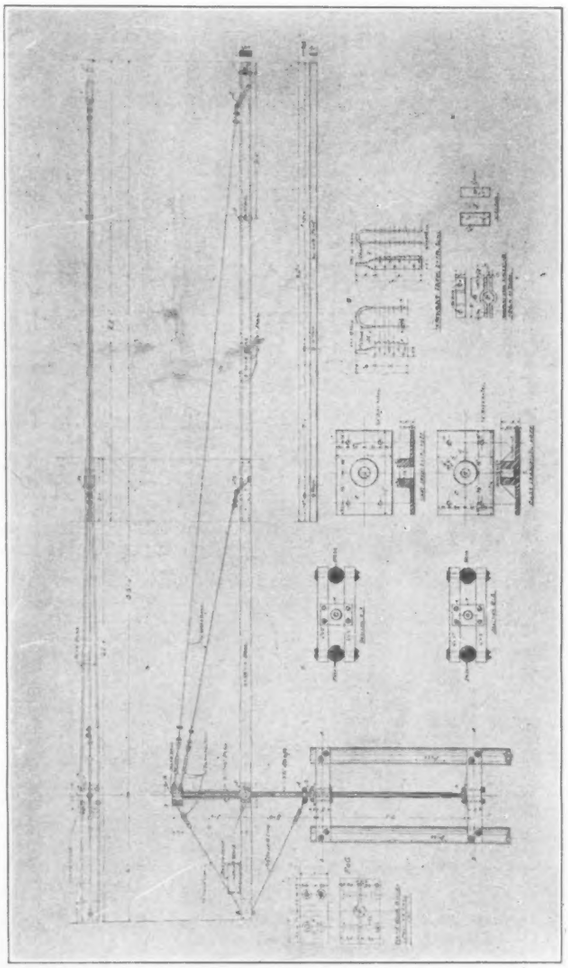
1. Would make inner circle four piling on a similar tank, as the diagonal bracing at column points interfered with removing the dirt from excavation.



Drawing No. 2.

Photo No. 3—Shows piling all driven for both inner and outer ring, also four piling in center, two long and two short, for carrying tram. The sheeting for top section started. The Derrick on line "A" "B" to the south of tank center.

on the top course of sheeting, and 6 inches by 8 inches in the lower course; also, 6 inches by 6 inches for braces on top course, and 8 inches by 8 inches on the lower course. The sheeting was all 2 inches by 8 inches, by 12 feet, sharpened chisel-shaped on lower end with the flat



Drawing No. 3.

side facing out. All sheeting was available for use after tank was completed and removal of same is described under excavating.

Excavating and Filling.—All excavating was done by hand, the first 6 feet being loaded into wagons. When water appeared in the excavation sheeting was then placed and the dirt is shoveled into a scale and hoisted out with the derrick. The derrick dumped dirt into chute and was held there to be dumped into the wagons by gravity and hauled to the city dump a mile away.

The first, or upper section was 16 inches wider than the lower section, and after the first 11 feet was excavated the second set of sheeting was started, on the inside of the first sheeting, as shown on drawing No. 4. On account of the water encountered we kept a grade toward the sump hole; that is, the low point of the excavating was held at the sump hole with a slight grade up from this point to the right and left of the annular ring, in which way the dirt was kept fairly dry for handling.

After the concrete tank was completed above lower sheeting, dirt was filled in between the inner sheeting and the mound and the outer sheeting and the dirt backing, the lower sheeting being pulled out by aid of an ordinary sheeting puller, several planks at a time, all of which, as well as the bracing and stringers, were available for use, and were sold for what we paid for it, caused by an advance in the price of lumber.

Drain for Water.—When excavation reached a material deemed sufficiently strong to hold the weight of the tank, water and guide frame, an excavation for a drain was made in the center of the annular ring 2 feet wide, the high point of which was diametrically opposite the sump hole. Crushed rock a few inches deep was laid in the bottom of the excavation and a three-sided wooden drain was carefully fitted, leveled, and placed on top of the rock, open side down. The rock and drain had a fall from the high point to the right and left toward said sump hole, and crushed rock covered the sides and top sufficient to clear the bottom of tank 6 inches. At 10 points in the circumference of the drain 3-inch openings were bored through the top, a 3-inch railing floor flange bolted to the box over the holes, and a 3-inch nipple, threaded both ends, one end screwed into the flange, the other or top

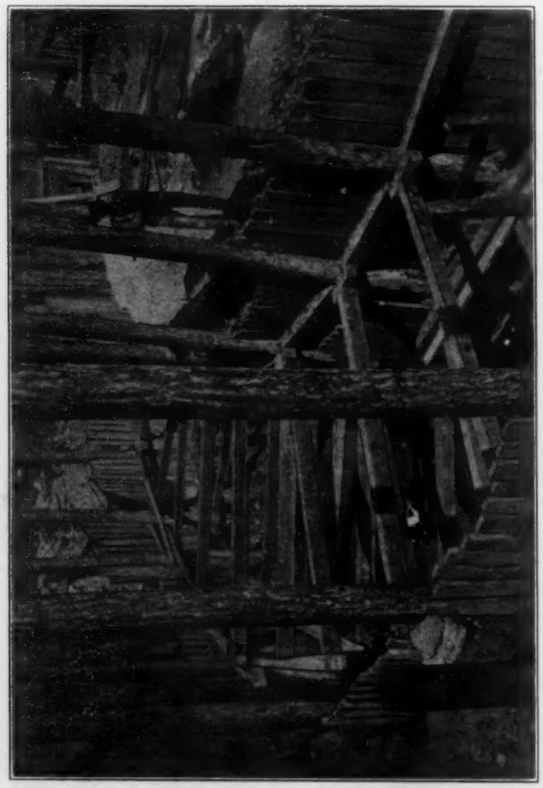
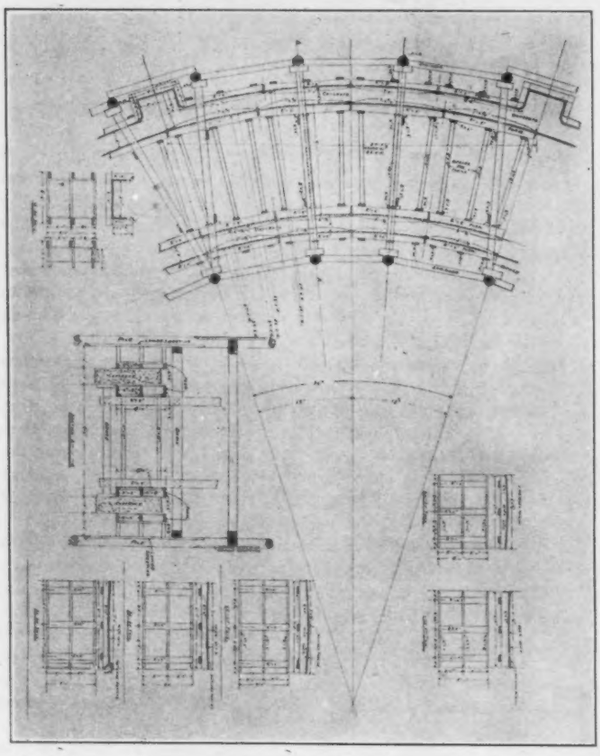
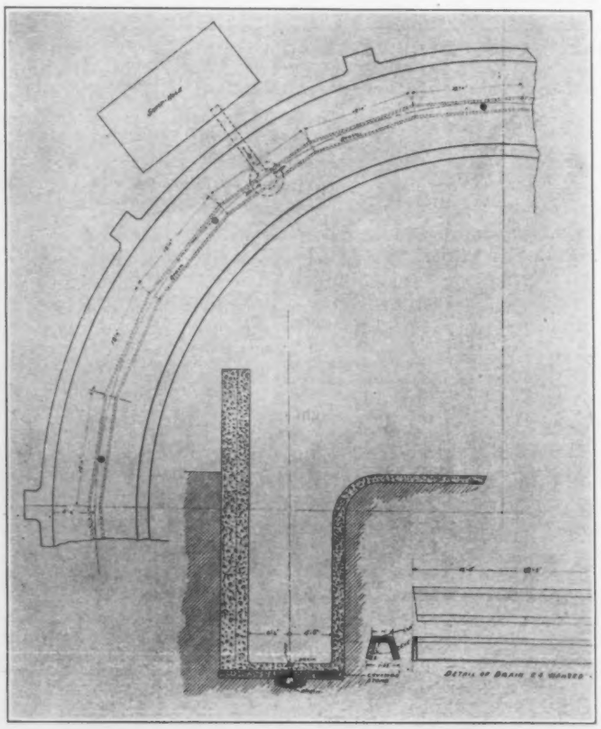


Photo No. 4—Shows timbering on the south around annular ring and upper sheeting nearly all in place, as well as lower sheeting started, the top of which is shown directly below where man is standing.



Drawing No. 4.



Drawing No. 5.

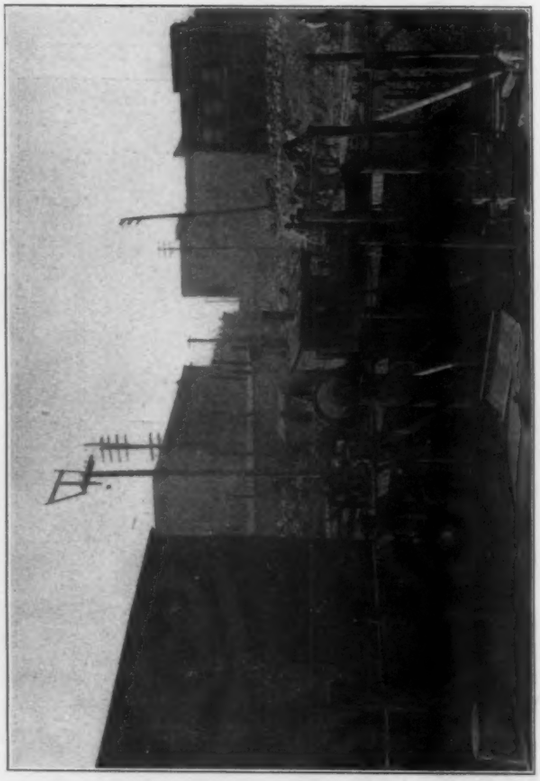


Photo No. 5—Shows "Smith mixer" and engine in place above alley level. One 24-inch outlet standpipe in place up through the mound, and forms piled on mound ready to be placed.

end having a 3-inch socket and plug. These pipes were cut to a length that the top of sockets would come level with the finished bottom of tank. The plugs were left out during construction, the pressure of water could be relieved from the underside of the concrete in case of a heavy rainfall, stoppage in pumps, or drain. The two ends of this drain emptied into a small concrete pit, 2 feet in diameter, in center of annular ring, and into this pit at the side connected the 12-inch sewer pipe described before, leading into sump hole. The top of this pit was left open until bottom of annular ring was finished for the purpose of cleaning the drain if necessary, a reinforced top closing the opening, before finishing the tank bottom at this point.

Inlet and Outlets.—One 30-inch inlet and two 24-inch outlets were supplied, laid below the tank bottom and drain. The standpipes inside were placed a few feet inside of the inner ring of tank, an excavation

being made for each in the mound. Concrete was placed around these pipes, including the drip pots from the ground level on the outside of the tank to the top of mound on the inside, the space in excavation not occupied with the pipes and concrete being filled with dirt and thoroughly tamped.

FORMS.—*Photo. No. 5.*—Eight sets of forms were made as follows: Two for inner wall, two for outer wall, two for columns outside of the outer walls, one for walk-around. Each set of circular forms was made 4 feet high, as a unit of four usually works out well in any system of work. One complete circular set was made for the walk-around and the inside circle next to the mound, and two complete sets for all the others. This was necessary in order to keep the carpenters placing forms while concrete was being poured.

These forms were placed so that the outside circle was about 2 feet higher than the inside circle, and vice versa, only 20 inches to 22 inches of concrete being poured at a time. This also was a benefit in keeping carpenters at work and produced less strain in holding forms in their place by too much weight of concrete against them at one time.

WALK-AROUND—*Photo. No. 6.*—Level with the top of intended finished tank, 3-inch by 12-inch planks were placed across annular ring, and bolted to inner and outer piling. These acted as braces for the piling, as well as joists on which to rest the walk-around. The walk consisted of 3-inch by 12-inch plank, cut to a miter, spiked to each joist, and placed directly over the outer wall of tank. These planks were dressed on top side and, when circle was completed, a circumference line was inscribed with aid of tram the exact diameter or position of the ¾-inch vertical rods in the outer wall. On this line, at intervals of 2 feet, ¾-inch holes were bored, through which the top end of vertical rods passed and were held in place, as well as two of the 2-inch anchor bolts for columns, the rest of the column rods being held in place by a special frame or center nailed to said walk-around.

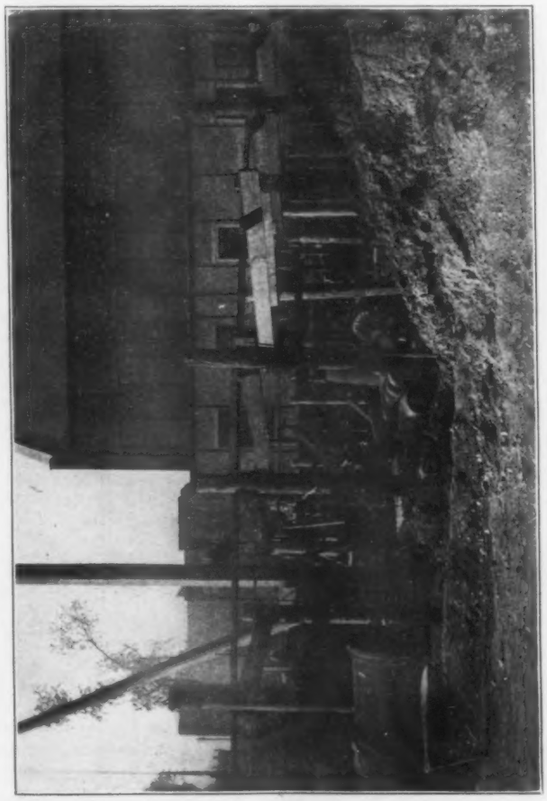


Photo No. 6—Shows joists connecting piling across annular ring and the walk-around or center nailed to joists directly over position of outer annular wall, also pipe and specials for inlets and outlets.

ANCHOR BOLTS.—*Photo. No. 7.*—There were forty 2-inch anchor bolts for the columns, 33 feet long, four bolts to each column, with each bolt upset to 2¼ inches; on one end 5 inches of a thread was cut for 2¼-inch hexagon nuts, thus getting a full 2-inch bolt. These bolts were hung from the templet or walk-around so that all the thread would be above the finished tank top. The lower ends of the bolts rested on a light base of concrete at the underside of or below the annular ring. The bolts were set plumb and built solid in the concrete piers. No piping being allowed around the bolts at the top to be filled with concrete after the guide columns were placed, but set solid in their place. When the holder columns were placed, every bolt cleared the bolt holes on the base of the column and no trouble was experienced by the holder contractor in placing any part of the guide frame. I mention this particularly to show that the bolts can be built and held to the exact center, if ordinary care is taken during construction, therefore getting a guide frame placed plumb in every way.

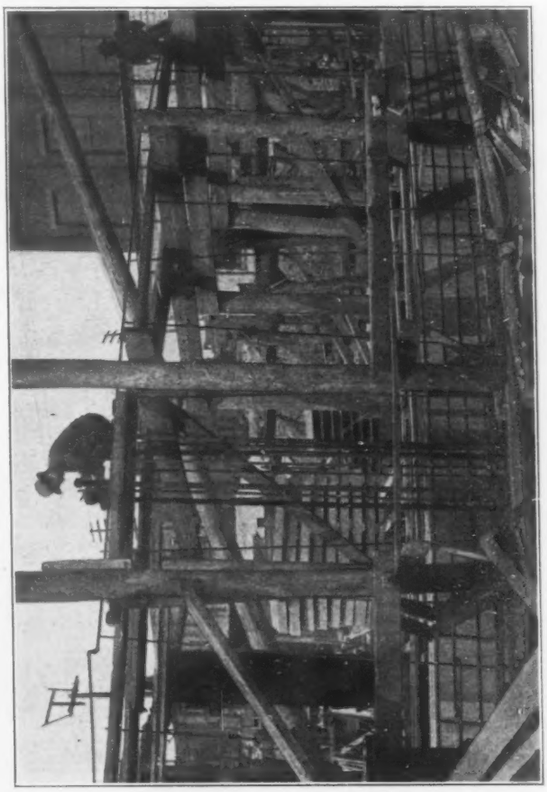


Photo No. 7—Shows reinforcing 1¼-inch horizontal rods in place above grade. The ¾-inch vertical rods extending through the walk-around, also the 2-inch anchor bolts and 1-inch vertical rods for one of the piers for column, all extending through the walk-around. One 24-inch outlet pipe finished. The boom of derrick shows at upper right-hand corner. The man is placing a nut on anchor bolt. The ⅜-inch rods around the 2-inch column bolts can also be seen close to bottom of photograph.

REINFORCED RODS.—*Photo. Nos. 7 and 8.*—The rods were ⅜-inch, ¾-inch, 1-inch, 1¼-inch, the first being used for verticals and across bottom of annular ring, and around circumference in bottom of said ring. The vertical ¾-inch rods on inner circumstances wall rounded over the mound about 10 feet; ¾-inch rods were also used for horizontals on inner wall.

The ⅜-inch rods, used on top of the mound and walk-around, were also placed horizontally around the 2-inch anchor bolts in piers, at intervals of about 8 inches, to strengthen the column piers.

The 1-inch and 1¼-inch rods were used horizontally in the outer wall of annular ring and walk-around, and then 1-inch rods in each column pier from the bottom to top, to help carry the weight of the guide frame and columns. These rods were mild steel direct from the mills, and were about 33 to 36 feet long, the ultimate tensile strength being 60,000 to 64,000 pounds.

The ¾-inch vertical rods were bent forming an ell with the 3-foot vertical side in the center of inner wall, thence across bottom and up the opposite side in center of outer wall, terminating at top of templet through the ¾-inch holes left in said templet or walk-around, alternating with these verticals at one foot centers in the bottom. The 6-foot vertical side was placed in the outer wall, thence across bottom and up the opposite side in center of inner wall. At the ends of all rods, excepting top end of ¾-inch in outer wall, a hook was turned. The horizontals in inner and outer walls were placed outside of the ¾-inch verticals with the hooked ends not less than 6 feet apart. We took particular care not to hook the ends, preferring to leave concrete between the hooks of the lapping ends, which adds strength in addition to adhesive surface of concrete on the rods, all of which was necessary to keep them from pulling out at the lapping points. These rods were spaced, as nearly as possible, as per drawing, and were wired to vertical rods where necessary to hold them in place, a light annealed

wire being used for this purpose. The horizontal rods were placed before the forms were set, never above the forms, as they would interfere with the pouring of the concrete. All rods used were round, and should not be otherwise, as the concrete will not always cover rod on underside, if other than round.

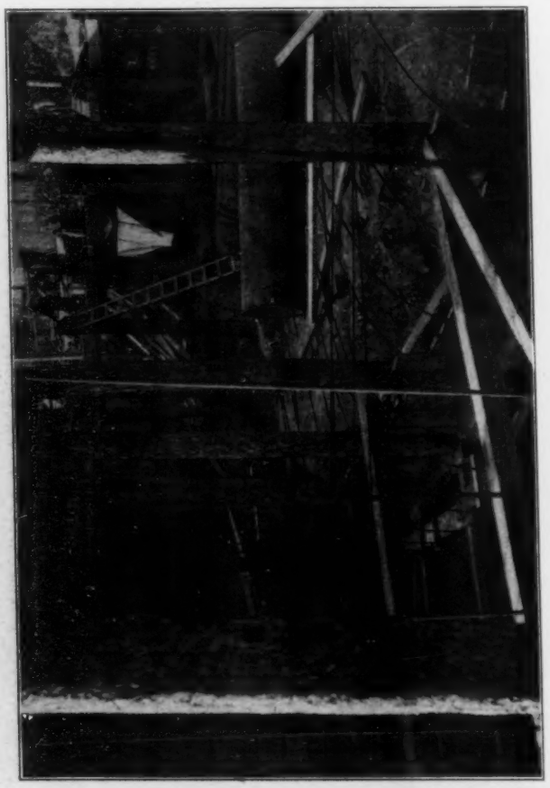


Photo No. 8—Shows south side excavation and sheeting finished; ¾-inch vertical rods placed in inside annular ring and bent over the mound. Also several lengths of cast iron pipe for inlet and outlet pipes.

ANCHOR WALL PLATES.—Wall plate anchors were placed and bolted in the inside of the forms opposite the columns, half-way between columns, 20 vertical rows in all, for the purpose of bolting the guide rail plates to when tank was completed. There were six wall plates to each vertical row. Great care must be taken in placing these in line, and that the faces of all plates are equal distant in a radial line from the center of tank.

WALL PLATES.—The wall plates for the outer sections are ¾-inch by 6-inch flat iron, and are fastened to the anchor plates as follows:

A ¾-inch hole was drilled in each plate opposite the slot of each anchor wall plate, the hole being reamed out on the outside of plate or the side on which the roller traveled for the head of the bolt.

A ¾-inch plow-bolt, with slotted head, passed through these holes, leaving the head of the bolt flush with the face of the wall plate, then through the slot in anchor plate and screwed into a nut 3 inches long and 2 inches wide, which slipped into a recess in this plate back of the slot left for this purpose. The wall plates were then plumbed and backed with concrete mortar; also the recess and slot-in-wall plate filled with mortar.

Tensile Strength per Square Inch on Average of Five Samples.

	Neat Cement.			1 Cement, 3 Sand.		Tests, Steaming & Boiling.		
Test No.	24 Hours' Test.	7 Days' Test.	30 Days' Test.	7 Days' Test.	30 Days' Test.	24 Hours' Air.	3 Hours' Steaming.	3 Hours' Boiling.
1	421	787	897	314	407	Good.	Good.	Good.
2	465	834	892	316	401	"	"	"
3	413	786	850	300	435	"	"	"
4	428	836	—	287	—	"	"	"
5	415	827	—	290	—	"	"	"
6	416	829	—	287	—	"	"	"
7	379	811	—	313	—	"	"	"
8	361	875	—	281	—	"	"	"
9	382	922	—	303	—	"	"	"
10	403	870	—	295	—	"	"	"
11	263	778	825	357	408	"	"	"
12	403	809	—	304	—	"	"	"

	Test for Fineness. Per Cent. Passed Through Screen.			Time for Setting in Hours. Minutes.		Test for Rise in Temperature in 15 Minutes.	Test for Setting in Cold Water.
Test No.	100 Mesh.	74 Mesh.	50 Mesh.	Initial.	Final.		
1	94.0	98.8	99.6	1:55	3:05	70° to 75°	Good.
2	92.8	97.3	99.3	1:50	3:15	71° to 76°	"
3	92.0	96.6	99.3	1:50	3:05	72° to 77°	"
4	95.4	98.5	99.6	2:05	5:40	70° to 74°	"
5	95.7	98.6	99.7	2:50	5:45	70° to 74°	"
6	95.5	98.8	99.7	3:05	5:55	70° to 74°	"
7	95.0	98.4	99.7	2:55	5:20	70° to 74°	"
8	93.7	97.8	99.7	2:50	5:10	71° to 76°	"
9	94.3	98.2	99.8	3:05	5:15	70° to 75°	"
10	94.3	98.2	99.8	2:55	5:15	70° to 75°	"
11	96.5	98.9	99.8	3:55	5:50	70° to 74°	"
12	96.5	98.7	99.8	3:05	5:15	71° to 74°	"

The essential materials for good concrete well known by all are: Rock or gravel, sharp sand, Portland cement, water.

We decided on using a "Binder" rock, in size running from small chips to possibly 1¼-inch cubes. We preferred good, washed gravel, but this was not obtainable. Sharp sand needs no description. The cement should be carefully tested, which we had done at the city testing plant. In the table of tests each test number represents one carload, all of which was accepted and used in the tank.

No. 11, on 24-hour test, not showing as high as others, was held for 7-day test before using. This carload was fresh from the mill, thus accounting for low tensile test in 24 hours.

MIXTURE OF CONCRETE.—The next point to be decided was the proportion of materials. We decided to make a test on two slabs, the first, 1, 2, 4 mixture; the second, 1, 3, 4 mixture. For this purpose we made two boxes, 3 feet long, 1 foot wide and 1 foot deep inside. Two batches of concrete were measured as per above mixtures, and placed in the two boxes which made two slabs of concrete 1 foot wide, 3 feet long and about 6 inches thick. These were allowed to set six months, when the boxes were removed and a test made for strength by weighting until they broke, with the following results:

No. 1, or 1, 2, 4 mixture, 2900 lbs.

No. 2, or 1, 3, 4 mixture, 6276 lbs.

We, therefore, decided to use No. 2 mixture, as the mixture of sand and cement evidently added to the strength and was closer in every way, no voids appearing, and as a water tight tank was necessary, the mixture proved at the finish we decided wisely.

Before pouring any concrete we covered all the bottom of the annular ring between the sheeting with crushed rock, probably 8 inches thick, and leveled the same. The rock was then tamped with a heavy tamper, and on this rock the concrete was poured to the required depth for the bottom of annular ring. This rock prevented the concrete from sinking into the earth, serving as a passage for the water to percolate and reach the wooden drain.

MIXING AND POURING.—*Photos No. 5 and No. 10.*—For this purpose a Smith mixer was placed at the northwest corner of the site a little above the alley grade. About ½ cubic yard was mixed at a time, and every foot of material for each batch was measured and placed in the mixer, water measured with a bucket being thrown in with the material. Just above the mound, and over the annular ring, a light track was laid for carrying iron dump cars V-shaped, which dumped either side. Into these cars the mixed concrete was dumped from the mixer, carried around the tank and dumped into a chute and into place between the forms of both the annular rings. This method was used up to the top of the mound. For the bottom of the annular ring, top of mound, and the outside of the annular ring above the mound, the concrete was dumped from the mixer into an iron bucket in the shape of an inverted cone, with a quick-closing, hinged lid on the bottom. At the top of the bucket three chains were fastened to the circumference and brought to a ring in the center, 4 feet above the bucket; this was hung from the ropes of the derrick boom, and swung to any point desired, the lid opened and concrete dumped.

On account of the vertical rods of tank walls being in the way, a few sections of 6-inch pipe, flanged at the ends, were made of sheet iron, 4 feet long, the lower section curved and top section hopper-shaped, into which the concrete was dumped, and landed in place. These chutes were light and easily handled and as each form or 4 feet was filled, one section of pipe was removed. Four of these chutes were used so there was no delay placing concrete.

MOUND.—*Photo. No. 9 and 11.*—To finish the center point the tram was removed, all four piling around center were cut off, one foot below mound level, a hole was excavated one foot deep and of dimensions sufficiently large to clear outside of piling and the excavation filled with concrete. With a few reinforcing rods on top of this foundation, the ⅜-inch reinforcing rods of the mound were lapped over and the concrete top of the mound covered these rods.

CENTER PIER.—*Photo. No. 12.*—An old piece of 42-inch diameter smokestack, cut to required length, was used for an outer form. A core was placed in the center, 26-inch diameter, made of 4-inch strips nailed to several circular pieces of wood 24 inches diameter

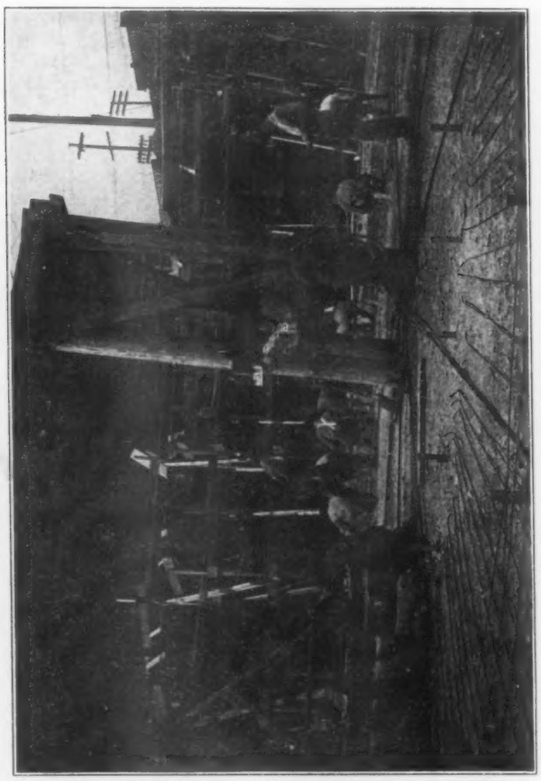


Photo No. 9—Shows outer wall finished with inside forms still in place and men laying out rods on top of mound. Piling for tram shown in center. Bu i wheel of derrick shown to left. Men facing top side of the inner finished concrete wall.

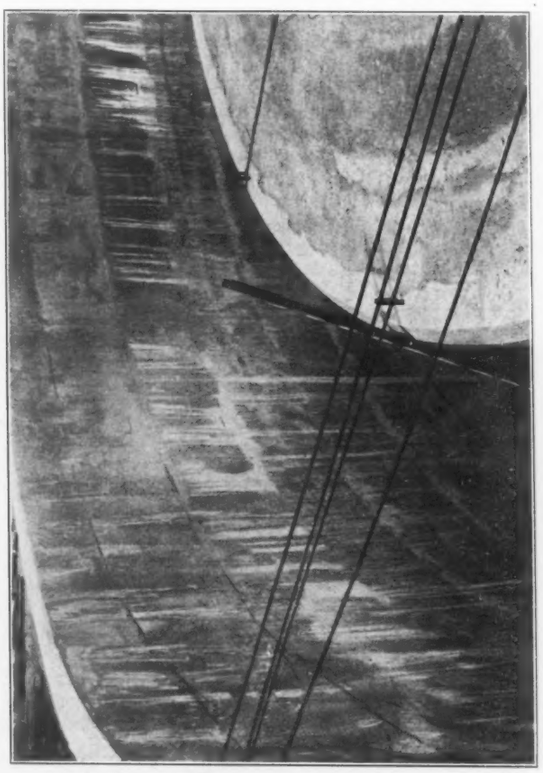


Photo No. 11—Shows section of completed tank. Top of outer ring at upper left corner. Mound finished and man's head is shown as he ascends the ladder out of the annular ring. The cables belong to the derrick, but go over the top of the outer wall, not shown in photograph.

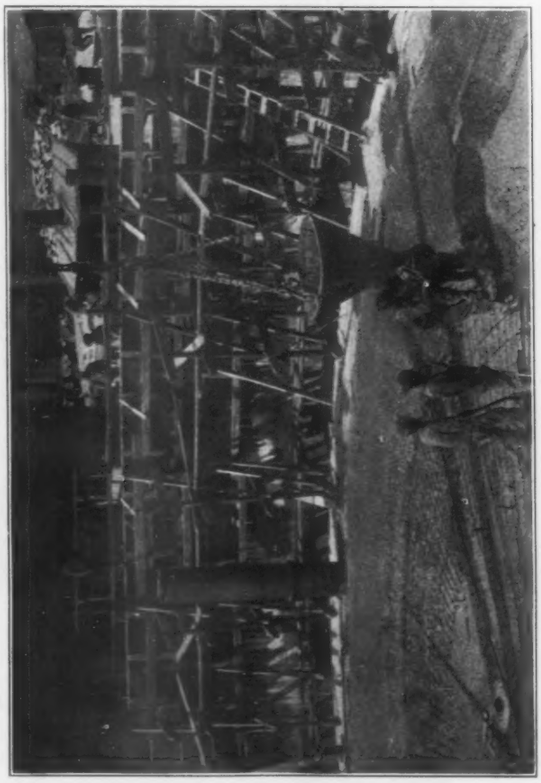


Photo No. 10—Shows view taken from same place as No. 9 photograph. Form removed at extreme left, exposing top of finished outside wall, also inner tank piling removed. One 24-inch standpipe is shown. Concrete dumping from hopper hung from derrick boom. Man has hold of catch for lid on hopper. Concrete being poured on top of mound from outer edge toward center. Grade stakes for top of concrete are also shown. More reinforcing rods are yet to be laid in mound center back of men.

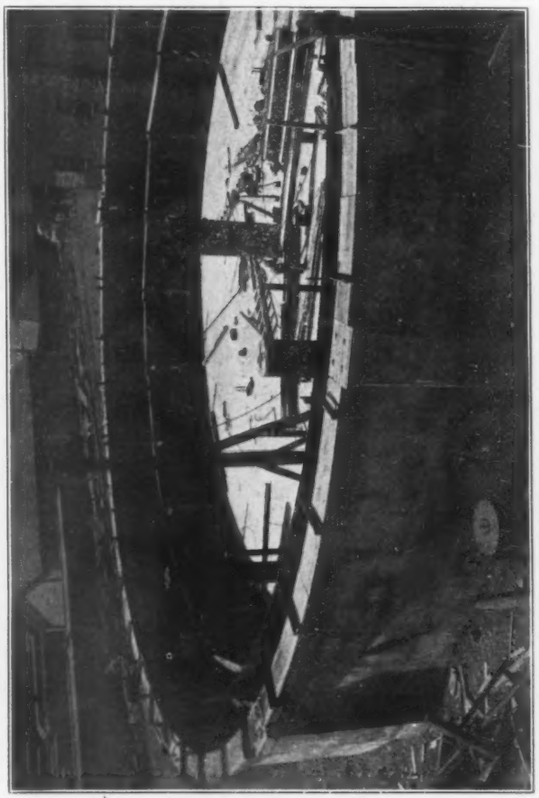


Photo No. 12.—Completed tank with shell of inside section finished, waiting for top curb angle. Wooden planks are on top of the concrete walk-around, with scaffold for holder men, hanging over the top of walk-around. One full column pier is shown. The 30-inch inlet standpipe, both inside and outside, and one 24-inch outlet standpipe. The pipe in center is the outside form for concrete center pier not completed.

for the inside form, and concrete was poured between the two forms for the pier, with a cap stone on top, 30 inches in diameter. On top of this cap stone rested the crown sheet of the holder. On top of the mound, and set in the concrete at required points, we placed straps of iron vertically, two at each point, to bolt the wooden columns of permanent staging to, to support the crown of the holder. Both sides of the vertical walls, the top of the mound and bottom of annular ring of tank were brushed with a wash made of neat cement to make tank water tight. This coating, liquid in form, was applied to the concrete before it had dried out, in the same manner that whitewash would be spread with a brush.

Filling Tank.—*Photo. No. 13.*—When holder was finished the tank was cleaned out, 3-inch plugs were placed in sockets at openings of the 3-inch pipes connecting to drain in the bottom of annular ring and a small mound of concrete placed over the plugs.

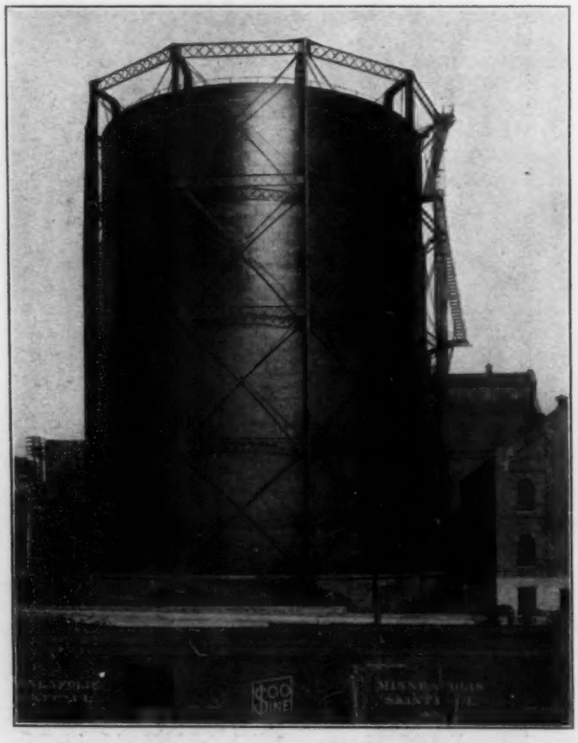


Photo No. 13—Shows south exposure of holder and guide frame finished and in commission, with walk-around concrete tank shown just above the fence. A stone wall on property line of Fourth street to hold grade level and carry fence. Building to right and east of holder constructed after completion of tank and holder. Building to left and west same as shown on photograph No. 1, not on our property.

Water was then turned into the tank from two of the city fire hydrants and when it reached 4 feet in height the pump in sump hole was shut down, water allowed to accumulate in drain and sump hole standpipe. In eight hours when the water in tank had reached top of mound it was shut off, a record of the height of water taken and allowed to stand until the following morning when an examination was again made of the water line, which was found to be at the exact height as the night before, showing there was no leakage in the annular ring to top of the mound. Water was then turned on again and the filling of same up to the tank overflow was finished in 11 hours. The water was allowed to stand in tank without any further filling for 5 days and as no perceptible leakage could be found up to this time we proceeded to test holder with air. This tank has been filled since October 5, 1906, and not one drop has been pumped into it since. The tank is absolutely water tight notwithstanding it has been subjected to temperatures ranging from minus 30° to 110° on the outside ring, for some 9 feet above grade level of the entire circumference with the exception of 50 feet to the west adjoining the alley, while the inside of tank must be above freezing.

A Few Notes.—Work was started driving piling, July 29, 1905, and October 23 we started mixing concrete and finished bottom of annular ring October 28. Numerous delays, caused by strike on railroads, rain, etc., made the actual working days to this time only 60. When freezing weather set in we suspended operations for the winter. All pumping was stopped and water allowed to rise in annular ring some 16 feet, which froze over on top, and the concrete in bottom was protected by the water.

March 19, 1906, we again took up operations and started pumping out the water. After this was finished an accumulation of mud had to be removed from the bottom. The weather remained cold (below freezing) so that we only got started pouring concrete, April 17, and the tank was completed May 31. Allowing for Sundays and rain, the actual time constructing the tank was 40 days. The total working days then were 95, or about 3 months, not counting the time of closing down and starting in the spring. The derrick was left in a few days to lower the iron into the pit for holder contractors.

Photo. No. 14.—The concrete walk-around was used to rest lowering jacks, and were clamped to the walk-around. The outer sections were each hung from them during construction, the riveters using the curb sheet of inner sections to stand on. This saved an expensive staging on outside of tank. The mound, which is 78 feet 6 inches diameter, proved an excellent place to store material during construction of tank and holder, carry derrick or excavating machine, etc.

The gallons of water to fill this tank 31 feet in depth were 971,850; if mound had been removed would have required 724,040 gallons more, or 1,695,890 total, with considerable more to be pumped and kept from freezing in the winter.

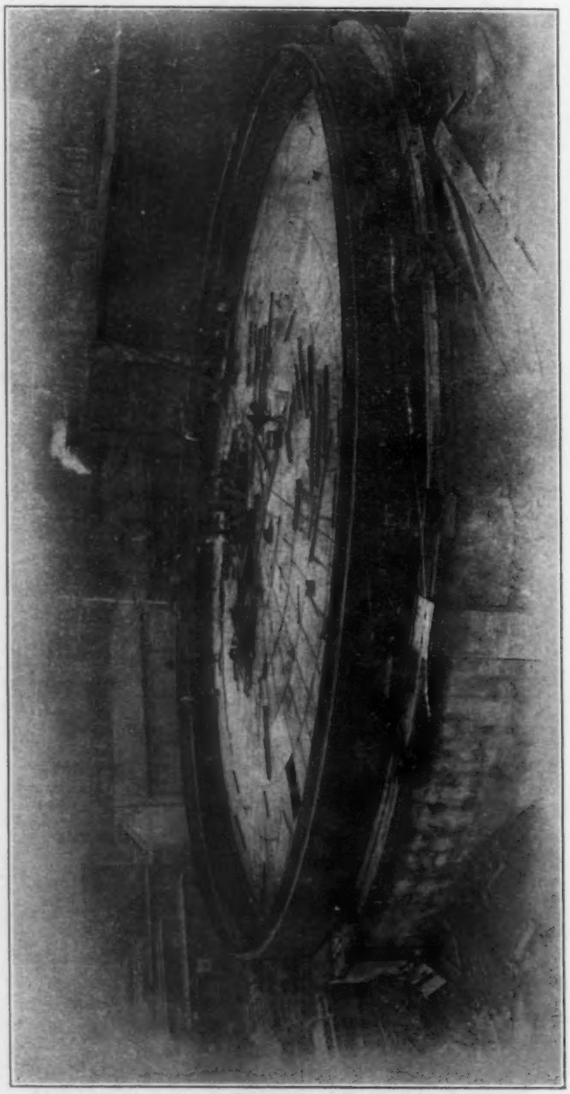


Photo No. 14—Shows tank walk-around with lowering jacks fastened to it. Second section of holder hanging to the lowering jacks. The men on the far side of the photograph are just placing the last piece of iron to finish the grip and dam sheet. The crown of holder is finished, with exception of a few sheets left out for ventilation.

A tank below ground is safer and better than a tank above ground, and can be constructed as cheap as a steel tank above ground; will last practically forever, if constructed of concrete, and requires no painting or repairs after completion. Anchor ice is unheard of, exhaust steam can be used to heat the tank, with less exposure to storms, easier of access and numerous other advantages over an above-ground tank.

Some Units of Costs.—In large units and where there is sufficient room to deliver all materials in carloads, close to the work on hand,

machinery used for the bulk of the excavating, and dirt dumped around the circumference of the tank, the costs at prices prevailing today would be about as follows:

	Cents.
Excavating per cubic yard	0.25
Piling, other than cedar up to 40-foot lengths, in place per lineal foot	0.32
Total	0.57
Timbering and Sheeting for holding sides of excavation in place per square foot of walls or excavation braced, material 4.5 board feet of lumber at $30 per M.	0.135
Labor placing and removing timber and sheeting	0.03
Total	0.165
Forms. It requires 6.5 board feet of lumber for each face foot of forms at $40 per M. costs	.26
Carpenters' labor and machine time for each face foot	0.04
Total	0.30
Or described in another way: 1 foot of a cross section of vertical walls requires 30 face feet, which equals 195 board feet.	
In this tank (where forms were required) the cost for forms and braces for each face foot of finished concrete is	0.0857
Labor handling forms, braces, etc.	0.0667
Total	0.1524
In larger units where depth of tank is over 32 feet there will be a decided reduction in cost per face foot.	
The cost for forms, bracing, handling, etc., in walls 16 inches thick, per cubic foot of concrete placed	0.229
Per cubic yard	6.18

These figures seem high, but they also would be reduced where the walls are thicker. Concrete mixed in proportions of 1, 3, 4 will make one-fourth more than the rock measures, that is the sand and cement equal one-fifth of the finished concrete, the rock four-fifths. The weight of a cubic foot of this concrete when four months old is 126 lbs. The labor required for mixing and pouring will cost $2.30 per cubic yard.

Reinforcing iron, at $40 per ton; the cost of material will average about $2.45, and labor shaping and placing 0.72 cents per cubic yard of concrete, that is for this tank. The cost of iron will be increased in larger units. There are other costs such as laying or placing inlet and outlet pipes, liability insurance, making and placing tram, making concrete bucket, rubber boots, steam pipes and numerous sundries that will average 10 per cent. to an estimate after obtaining the main costs as numerated.

Before closing I wish to express my thanks to Mr. C. A. P. Turner, of Minneapolis, for plans for reinforcing, and Messrs. H. B. Stiles and Alfred Lideroth, of the St. Paul Gas Light Company for plates and drawings.

Discussion.

The President—Does anyone wish to discuss this paper?

Mr. Elbert—I would remark there has been a great deal of talk about underground tanks and overground tanks, earth backing, etc. I am trying to get some data from the town authorities of Attleboro, Mass., about the reinforced concrete tank that was placed there in 1905 for their water company. This tank, or standpipe, is 50 feet in diameter and 100 feet high; it contains 1,500,000 gallons of water. It is all above ground. The base of the tank is 18 inches thick; the top 8 inches thick and the cost of the tank was $3,000 less than a steel tank.

A vote of thanks to Mr. Elbert was then passed.

The President introduced Mr. C. C. Simpson, Jr., of New York, who read the following paper entitled

PNEUMATIC CAULKING WITH LEAD WOOL OF THIRTY, THIRTY-SIX AND FORTY-EIGHT-INCH MAINS.

Mr. Simpson introduced the paper by remarking: I might mention before reading this paper that if I had picked out the title myself I would have labeled the paper, "Our experiences in caulking those sizes of pipe with lead wool and pneumatic hammers." We do not claim to be pioneers in getting successful results in this line of work. I understand the Brooklyn Union Company has done such work and that Mr. Hall, of the Central Union tried it out. I do not claim any credit for the idea. It was suggested by Mr. Bradley, Mr. Hall and Mr. Simpson, Sr., and I was merely given the work to do.

The first attempt at pneumatic caulking was made by this Company, the summer of 1900, on a 30-inch main, the joints being the regulation cast lead and yarn, with the depth of lead about 3½ inches. The experiment did not succeed, for two chief reasons: The first of these was the impossibility of caulking the lead back for more than ½ inch or ¾ inch from the face of the hub, the balance of the joint remaining in the same condition as when first poured. The more pressure applied, the tighter this ½ inch or ¾ inch ring is driven, until finally the hub splits. The second reason for failure was the inability to reduce the amount of time taken to caulk the joint. Given, the same amount of caulking time, for both hand and compressed air joints, the cost of the latter would naturally be higher on account of the operation and depreciation charges on the plant in use.

With the advent of lead wool, and its adoption by this Company to the exclusion of cast lead, the question of pneumatic caulking again came to the front. While lead wool joints are more efficient than those made with cast lead, there are two factors which make them more expensive. The first of these factors—the cost of the raw material—we are unfortunately unable to control. The second factor is, the length of time necessary to caulk the joint. When we consider that it takes two experienced caulkers 10 hours to yarn and caulk one 48-inch lead wool joint, it is evident that the labor cost is a rather large item. Anything which will reduce the caulking time, without a corresponding increase in labor, will result in a material reduction in the cost per joint.

With this end in view, it was decided early in the spring to make a series of tests on pneumatic caulking, with the idea of introducing it on the large mains to be laid during the summer. At the time, there was in process, at our 111th street yard, a school of instruction for lead wool caulkers, and by carrying on our tests at this time and place we were able to secure a very fair comparison between the hand and air work.

For this hand caulking instruction, a number of specially prepared 30-inch, 36-inch and 48-inch joints had been set up. These consisted of very short, split-hub sections, held firmly together by wrought iron bands, with spigot pieces, 4 or 5 feet long, inserted in the hubs, the whole joint being firmly held in place by posts and braces. These joints were yarned and caulked and record of the time kept for each operator. After the joints were finished they were cut open, so as to be possible to inspect and weigh the lead wool contained in the finished joint. This weight was compared with the average weights of cast lead and lead wool usually contained in a joint of the size in question. In addition to this, a random section of the lead wool was cut out with a hacksaw, and its specific gravity obtained to determine how nearly the lead wool had been compacted to the density of cast lead.

Lead wool is caulked in the following manner: The material comes from the manufacturer in strands about ½ inch in diameter and from 2 to 3 feet long, each strand being twisted up to about the shape of an old-fashioned cruller. These are straightened out and re-rolled until we have a fairly hard strand, not quite as thick as it was originally, with a slight taper at each end. These strands are caulked into the joint separately, taking care, of course, that the breaks do not come directly over one another, and when the face of the hub is reached the joint is finished off in the same manner as with cast lead.

The first joint attempted was a 48-inch which had been previously yarned by hand. We used a small gasoline driven compressor, of about 50 cubic feet capacity, and were furnished with hammers by the Ingersoll-Rand Company, who also sent an expert to give us any assistance necessary. No attempt at speed was made on this joint, as it was necessary to instruct several green caulkers in the handling of the hammers and also to do some experimenting in order to produce a proper caulking tool. The hammer used was an Ingersoll-Rand "Imperial" chipping-hammer, with a 3-inch stroke. The tool which we finally found to give the best results was forged from a ⅞-inch hexagonal steel, tool-blank, similar in shape to that shown in Fig. 1. On the completion of this 48-inch joint, the split hub was removed for inspection. The lead wool found to be very well compacted, the few irregularities being due, no doubt, to the caulker's failure to put enough of his weight against the tool. The yarn had been driven back about ¼ inch and was hard enough to have made in itself a gas-tight joint. The weight of the lead wool was a few pounds lighter than the average; but taking into consideration the fact that this was the first attempt, and that the caulkers were absolutely unfamiliar with their tools, the result was more than encouraging.

As it was necessary to come to a decision in a very few days, whether or not we should adopt pneumatic caulking, it was decided to make the balance of the tests on 30-inch pipe, this being an average size and taking much less time to caulk than 48-inch.

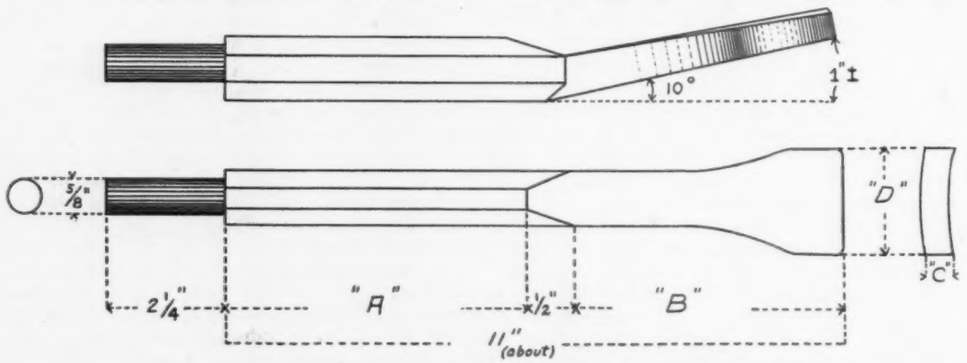


Fig. 1.—Dimensions of Caulking Tools.

Size of Pipe.	30-inch. A	B	C	D	36-inch. A	B	C	D	48-inch. A	B	C	D
Yarning iron	6¼	4¾	⅜	1⅞	4	6	⅜	2¼	3½	7	⅜	2
Caulking tool No. 1	6¼	4¾	⅜	1⅞	4	5½	½	2	4½	6	½	2
Caulking tool No. 2					4	5	9/16	2	5½	5	½	2
Caulking tool No. 3									6½	4	⅜	2
Finishing tool	6¼	4¾	⅝	1⅞	4	4½	⅝	2	6½	4	1	2

A 30-inch joint was, therefore, yarned up and the Ingersoll-Rand representative volunteered to caulk this against time. The joint was completely caulked by this one man in an hour, as against 5½ hours, the average time for handwork. Inspection of this joint showed it to be quite as well compacted and to weigh several pounds more than hand-caulked joints of this size.

An Italian caulker, who had handled air hammers before, was then placed on this joint and supplied with a helper to roll and place the lead wool, enabling him to caulk continuously. Francisco kept at it pretty steadily and finished his joint in 45 minutes. On inspection, it proved to be quite as good as the first, with the exception of being about 4 pounds lighter. No attempt was made at pneumatic yarning, as we had, at the time, no tool blanks of sufficient length to forge out a set of yarning irons. We decided, however, to try this out during the summer's work, and I might add here, that it has been more than successful. The information obtained by these tests was then placed before the head of the Department of Mains and Services. He decided that the scheme was worthy of an extensive trial under working conditions, and authorized the purchase of two portable compressors, with sufficient tools and equipment for each to work a gang of six caulkers.

There were a dozen or more makes of portable compressor outfits on the market, any one of which would probably have answered our purpose, though unfortunately, no one of them had been used before on this sort of work. The ideal outfit to meet the working conditions should embody the following main features:

Light Weight.—So as to be easily moved from one place to another without the aid of horses.

Self-Contained Water Cooling System.—The cost of a hydrant connection in New York city is about $4 per day.

Simple Gasoline Engine.—Gasoline is cheap and easily obtained, and most gasoline engines may also be run with gas. Steam is too expensive for an outfit of this size, and as both direct and alternating currents are used in different parts of New York city, 2 sets of motors would be necessary if an electric drive were adopted.

Air Capacity of about 50-75 Cubic Feet.—This will take care of 7 or 8 hammers, the maximum necessary to use under average working conditions.

Moderate Cost.—The more expensive the outfit, the greater the depreciation charge, which in turn naturally affects the cost per joint.

Fig. 2 shows a tabulated statement giving the cost, air capacity, etc., of the different outfits investigated.

Fig. 2.—Statement Showing Cost, Air Capacity, Etc., of Different Types of Portable Compressors.

Make of Outfit.	Cu. ft. Free Air per Min. Del'd. At Pressure of.	Weight Complete.	Type Compressor.	Complete Cooling System.	Motive Power.	Cooling System.	Cost Complete.	Remarks.
Abenaque	78 100	7700	8x8 Ing.-Rand "NE-I" single stage water jacketed	4 water cooling tanks with rotary circulating pump	15 h-p. 1 cyl. Abenaque gasolene	4 water cooling tanks	$1425	Highly recommended by users
Abenaque	64 100	7800	6x8 Franklin single stage water jacketed	do.	do.	do.	$1325	Well spoken of though Abenaque people claim to sell more of the I. R. type
Chicago Pneum. Tool Co.	70 90	over	6x8 Franklin single stage water jacketed	Water circulation	1 cyl. Chicago Pneum. Gas & Air cyl. are cast in one piece and work in tandem with a single piston rod	Water circulation	$1259	More or less experimental—No outfits of this type in market at time we purchased
Fairbanks Morse.	70 80	8900	8x8 Fairbanks Morse	Water circulation from tanks	12 h-p. 1 cyl. gasolene	Water circulation from tanks	$1120	Could obtain no data from users
Bury	94 90	9000	9x8 Class B. B. Bury	Water circulation from tanks	20 h-p. gasolene 1 cyl.	Water circulation from tanks	$1825	Rather heavy—unable to obtain recommendation from users
Nat'l Brake & Elec. Co.	100 90	8000	7½x9 3 cyl. National Brake & Electric	Water circulation with radiator	4 cyl. gasolene marine type 27 h-p.	Water circulation with radiator	$1900	Users of smaller sizes speak very highly of same. This outfit built specially for us

[To be Continued.]

[Abstract Report.—Continued from Page 260.]

SIXTH ANNUAL MEETING, NATIONAL COMMERCIAL GAS ASSOCIATION.

Held at Mechanics' Hall, Boston, Mass., Dec. 6th to 9th, 1910.

Second Day—Afternoon Session.

Discussion on the Rutledge Paper Continued.

Mr. Newman believed Mr. Rutledge had touched on a very important and much abused point when saying a demonstrator should call at variable times to look over installations. They sent out many return postal cards last year, and almost invariably the answers received where the complaint was poor gas it was found that an inferior burner was the cause. The burden of complaint was, "Your burner and gas are no good; can't get any light." The reason was the consumer bought a burner and put it on himself, not knowing how to adjnst it. Immediately came the complaint, "The gas is no good." By simply adjusting the burners he was able to correct the complaint in almost every instance. As to ranges, they found many instances where the consumer attempted to adjust them. Having made a failure of that, particularly as to oven burners, the assertion was made that gas would not cook anything. The inspector, however, soon put the ranges in good working order.

Mr. Roper supposed he would have to apologize for butting in on the paper on maintenance. Strictly speaking, he was not a gas man, but he thought he took as much interest in maintenance as anyone else. Mr. Rutledge wrote that every man connected with the gas business was a maintenance man. He supposed that might be correct, at least in a degree. His testimony would not be taken in court, for what he had to say was chiefly based on confidential talks with different people he happened to know. The greatest trouble to-day was that one had to take from the minds of some of the men that the gas business was not a commercial one, and when they had done so it would be an easy matter for them to become as maintenance men, whether they happened to be the president or the office boy. The day was fast approaching when the gas business would be considered a commercial one, and when they looked at it as such they had at least started right. The bankers have realized they must sell their money just as he had to do in selling a stove. When the gas companies got to that point they would be right. When a man realizes that he has a commercial business, the one on the floor, will be called a salesman, not a solicitor, and as the former he will be spry to wait on you. If you go into a jewelry or drug store, instead of having the salesman sit still while you tell him what you want to buy, he will not ask if you want it to day or to-morrow, but he will be right on the job from the start. Respecting salesmen, an important factor that they should take into consideration about them was that the large buyers, especially of department stores, were cultivating honesty. Let there be one price and no stretching of discounts as between sales.

Mr. Macbeth said he had endeavored to be a consistent advocate of good illumination, and hoped the day would come when good illumination meant gas illuminati on, without further explanation. Undoubtedly one of the particular demands of good gas illumination was good maintenance, and while people considered that maintenance should not be charged for, he would agree with them if they gave the character of maintenance that they would if they were getting $1 a lamp for it. Good maintenance could be too expensive. No qualification or restriction should be placed upon it other than that it be good maintenance. Unfortunately even those companies who say they are not interested in the cost, and are not charging their consumers, do go over their day sheets to find out what those costs may be. Being connected with the Committee on Illumination of this Association he reccommended that the accounting committee formulate a system of accounting for maintenance costs, so that such aggressive and progressive companies as chose to take up that line could be able to turn in figures comparable with figures from another company. He saw some figures showing the labor costs were such that a man could not possibly have put a step-ladder under each lamp he was supposed to have cleaned in a day. For companies that did figure costs he wished to show them something that would enable companies that considered mantle costs to handle 10-cent mantles and have them appear on their maintenance books at approximately 2 or 3 cents a piece. Perhaps that would appeal to someone. It might also interest some of the salesmen not directly interested in lighting who wish to make some easy money. He believed that 75 per cent., at least, of the mantles used in maintenance were wasted; frequently were deliberately destroyed. They are having a new generation of maintenance men every few days, and he did not believe maintenance men or fitters had been given the consideration to which they are entitled. A fitter could spoil more good sales than 10 salesmen could sign on a street. Why that fitter should be given a kit with instructions to go out on such a route without any knowledge as to the detail of the lamp or mantle he is about to handle, is beyond comprehension. There was a time when mantles were extremely fragile, and he heard a story told by a man who carried a box of mantles from Philadelphia to Pittsburgh. He did not sleep that night at all, and he held the box in front of him, not even daring to support it on his knee; but he succeeded in getting half the mantles through to Pittsburgh in shape to use. Some mantles are almost as bad as that to-day, the difficulty coming about through gas men assuming that the collodionized mantle has the strength and the flexibility of a rubber band. As far as handling is concerned you can do everything with a collodionized mantle that you can do with a mantle that is burned off. However delicate a burned off mantle may be, a collodionized one is not any stronger. It is true, you can dent a collodionized mantle and then with your finger push out that dent, then you may burn off that mantle, and apparently it will be standing up, but that piece may fall out within a day or a week. And be assured it will fall out, for it has been destroyed. Investigations were very recently made by making a tour of different places to observe how fitters removed mantles from boxes and placed them on lamps. Men skilled in that observation having noticed the way the mantle was removed, tapped the burner and the mantle fell to pieces. It was rotten. That same man has taken 20 or 25 mantles out of a similar box, burned everyone of them off, giving them a like test, and all were perfect. He undertook to bring that point out some time ago, and was foolish enough to ask 3 or 4 manufacturers for samples. He wanted to show something absolutely a mantle proposition, regardless of the maker. One manufacturer's mantle proved bad, that of another proved good; but the degree had nothing to do with the mantle. The kernel was in the way he removed it from the box. And if there was any one thing he would like to hammer in, was for goodness sake to cut out the knocking amongst gas men. Hundreds of other fellows are on the streets waiting for them. Let them get together, doing as the electric fellows do, be together all the time for everything gas. He had seen men taking a mantle out *so* [illustrating]. Often a mantle was so removed in that way, but when the mantle was burned off he did not believe it would stand very much. He might say the mantles before them were not prepared mantles in any special way. He simply took a number out of a box down stairs. By tapping a mantle slightly on a piece of wood any mantle that has been damaged in that way would show up very, very quick [illustrating]. He only made that demonstration that some of them might break up some mantles, not for the good of the mantle industry, but for their own good, to show the fitters how mantles may be damaged. Mantles had been taken *this* way, put on *here*, and jerked off *that* way. Watching any fitter on any of the streets where they use boxes of that kind, and they would find the same effect. That mantle had gone round the ring and was broken on one side. Anyone of them would give in the side or have a few pieces that you can knock out in that way, with that treatment. That mantle was absolutely damaged. Those mantles were damaged in removing them from the boxes, and they could not be damaged in manufacture without being discovered. The mantle was taken through to the collodion, and the suction, the drag on that collodion in dropping the mantle into it and drawing it out again, would develop nearly all of those difficulties. He heard a very interesting point some time ago. The operator always touches an upright mantle *here* in trimming it, and of necessity kicks a machine that works the trimming part. Finding that a certain series of mantles coming through were breaking off at the top on certain tests, on investigation they found, in the case of a particular operator kicking that machine, that the muscular effort caused a contraction also of her fingers, which jarred the mantle top. A great many people took an upright mantle out of a box in *that* way, held it *this* way and put it on the burner, and you will get exactly the same result. The mantle is gone on the skirt where he pinched it, and the top of it is gone where it touches on the top; it will break right aross the top, there. Sometimes the loops themselves broke right off, and the mantles are sent back; yet they were damaged while being taken out of the box. If the mantle is taken by the support on the box and removed in *that* way, they won't have any difficulty. It was not necessary to take much of their time on that, but he assured them there was not a more

important matter connected with mantle placing. The manufacturers had been endeavoring to get over that. One proposition with which they were familiar was where the mantle is inclosed in a mica cylinder, so there was no possible chance of getting at it to damage it that way. Another one was the ordinary box, a box of *that* kind, where there was not any possible chance of getting at the mantle. Simply take the mantle in *this* way, by the stem, lifting it up. Inverted mantles were handled in *this* way. Take the box out in *that* way, and there is a little metal clip to lift. The only way is to take hold of the mantle just like *this*, and put it right on. In a town where an investigation was made a fitter was asked to trim a lamp. He took it out *that* way and put it on the lamp. Take that mantle and straighten it out; it looks very nice, it is all right again. Salesmen will do that in showing a customer. The mantle was all right before he took it out of the box; he carelessly handles it, puts it back and says it is as good as ever [illustrating]. It is extremely difficult to show this so they could see. The mantle was split right in *there* just where he put that in. Remember, mantles are better, of course, than they used to be, but there had been too much advertising as to how strong they were and too little attention had been paid to training your fitters.

Mr. Roper—To emphasize what Mr. Macbeth said, he would state that, happening to be in a very progressive town, a gentleman came to him from one of the departments, after he had had a consultation with the manager, who was finely disgusted. He said, "If the people of this company were all boosters instead of knockers what a company we would have." A man in a department told me he would not do so and so because that was in the other department, and still another man would not do it because the job belonged to another man. If the buying, selling, installing and maintenance were all under one head, they would not have to get the men all together. He thought it one of the points that made the biggest difference in the world.

The President asked Mr. Rutledge to close the discussion, to which Mr. Rutledge replied that, as there was nothing to disagree with in the discussion, anything he said further would be very much like repetition.

The President introduced Mr. Henry Hughes, Auditor of the Denver (Col.) Gas and Electric Company, who read the following paper on

OFFICE AND ACCOUNTING METHODS.

In the past few years the new business department has grown to be of such importance in any company that its records must necessarily be carried out with considerable detail. The new business manager must first keep a very close analysis of all the new business accounts to enable him to secure the lowest cost per dollar of gross increase which his department secures. In order to arrive at this end, all the expenses of the department should be charged under the head of "Promoting New Business," and sub-divided under the following accounts: Advertising, circulars, demonstrations, salaries of solicitors, cost of appliances sold, piping and connecting appliances, and appliance or new business expense.

"Promoting New Business" should also be credited with the selling price of appliances sold. Going a step farther into detail, each of these subdivisions of expenses should show under the same headings as the gas sales, such as illuminating gas, domestic fuel gas, industrial fuel gas and power fuel gas, as the following form shows:

	Domestic Fuel		Illuminating		Industrial Fuel		Power		Totals	
	Total	Per Thousand	Total	Per Thousand	Total	Per Thousand	Total	Per Thousand	Amount	Per Thousand
a. Advertis'g, Newspaper, etc.										
b. Circulars and Distr'g										
c. Demons and Commissions										
d. Exhibition Expenses										
e. Salaries, Wages and Miscellaneous										
Totals										
Cost of Appliances sold										
Appliance Expense										
Total cost Appliances Received for Appliances										
f. Loss on Appliances										
f. Profit on Appliances										
Piping and Connections — Material										
Piping and Connections — Labor										
Piping and Connections — Misc. Exp.										
Piping and Connections — Total										
Piping and Connections — Charged Consumers										
Piping and Connections — Net Cost										
Total cost items a to g										

Form 1.

We will now follow down each subdivision, showing the classification of each.

Advertising and Circulars.—The first two accounts, namely, advertising and circulars, are the two accounts which represent the publicity part of the business, and the new business manager will find that this is one place where he cannot consistently cut down and get results. The best way for a large company is to put a good man in charge and start a regular advertising department, going into advertising in a systematic way, following up all prospects with circulars or booklets. In this department all space in the newspapers is checked up each day and the actual cost of sending out each circular and booklet is accurately kept under the "Job Check" system. A report should be turned in each month to the new business manager, so that he can tell just what it is costing to run this end of his department.

Demonstrations.—The most important item under this heading at the present time is the salary of young ladies who are sent to each purchaser of a range to demonstrate how it should be run so as to insure economy and good results, for a satisfied consumer is one of a company's big asets. In former days it was necessary to hold large meetings for the purpose of getting people to use gas ranges, but now that is all over, so the new business manager can eliminate this expense from his department.

Salaries of Solicitors.—The new business manager must keep very close tab on the men in his department to see that the right men are always working along the lines where they can get the best results and secure business that is the most profitable to the company. In order to secure the greatest results from a group of men in any kind of work they must be rewarded according to their merits. A new business department is no exception to the rule, and, no matter how difficult it may be to establish this method of compensation, it is theoretically correct and must prove out eventually. Each man's business should be kept in such form as to permit the checking up, both as to the class and volume of business he is turning in to the company. To do this, forms must be drawn up and used by the representatives or salesmen.

Form 95-4-6-10-5M.

.....191....

REPRESENTATIVE'S DAILY REPORT.

....Representative.

District No..... Total orders taken..... Time.....

Total calls made .....

Name.....

Address .....

Remarks .....

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

N. .....

A .....

R .....

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

N.....

A .....

R.....

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Form 2.

Form 4-7-5m-7-10.

REPRESENTATIVE'S TIME CARD.

Name .....

Dist.....

No..... Date..... .....191....

No.		Hours.	Rate.	Amount.	
1	Illuminating gas				
2	Dom. fuel gas – Ranges.....				
	" " " Water.....				
3	" " Heaters ...				
4	Dom. fuel gas—Misc.....				
5	Indust. fuel gas.....				
6	Power gas.....				
7	Office.....				
8	Misc				
9	Residence ltg. elec.....				
10	Inter. bus. ltg. elec.....				
11	Sign ltg. elec.				
12	Outlining				
13	Window ltg. elec				
14	Power.....				
15	Arc				
16	Fans.....				
17	Electric appliances.....				
18	High bills				

Approved..... ... Entered.....

Form 3.

Forms 2 and 3, the representative's daily report and time card, go together. Under Form 2, when the representative makes a call, he writes the name, address and remarks, also the time spent on the call, in the margin. The small numbers after the "R" represent the di-

visions on the time slip. If a representative took an order for a range he would put an "O" on Form 2, and, in his next call, if he found a prospect for a heater, he would put a "P" over Form 3. At the close of the day the representative makes out his time card from his report. From this report the date of each call is stamped on the back of Form 4, or house card, and there should be a card for every house or place of business in the city. These cards carry a great deal of useful information, and you can always tell when the representative made his last call.

Only
Other Tenants No .....St. or Ave.
Name..... .....Flat No. .....Rm. No. .....Floor.....
Owner..... .....Occupant .. ..No. Persons ..... Rent.....
Occupation .....Business Address.....
Owner N. Adress

Class.	Building.	Lighting Equipment	Fuel.		Electric.	
Dwelling	Brick	Electric	Gas Rge	Coal Rge	Int. Lighting Store "	
Flat	Stone	Gas	" W.H.	Gaso. "	Wind	Flat / Meter
Office	Frame	Oil	,, Grate	Oil "	Signs	Flat / Meter
Store	No. Rooms	Gasol'e	" Htr.	Coal Fur.	Fans	Flat / Meter
Factory	Value	Wired	" H. P.	Coke Fur	Elec.	Tostrs / Irons
Saloon	Bath Room	Piped	" Ldy S " Tlr. S	Coal Htr.	Outline	Flat / Met
Restaur't	Kitchen Ht	Service	Backus	Coke "	Arcs	Gas / Elec.
Misc.						

Ind Gas Appl .....Power.....Porch Light .....

Form 4 (Front).

Form 22-2-10m--2-10.
Territory Date

.....	
D	D
.....	
D	D
.....	
D	D
.....	
D	D
.....	
D	D
.....	
D	D
.....	
D	D
.....	

Form 4 (Back).

Form 33-I-8-10--5M.
The.....Co.
ORDER DEPARTMENT.
.....191
To Representative,
District No.....
The following orders, reports or complaints have to-day been received from customers in your district.

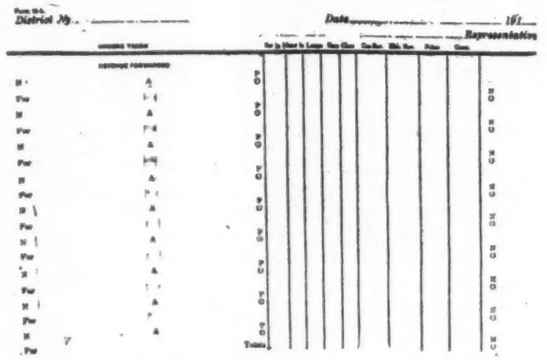
Order No.	Name.	Address.	Nature of Order.	Remarks.

Signed :
....Order Clerk.

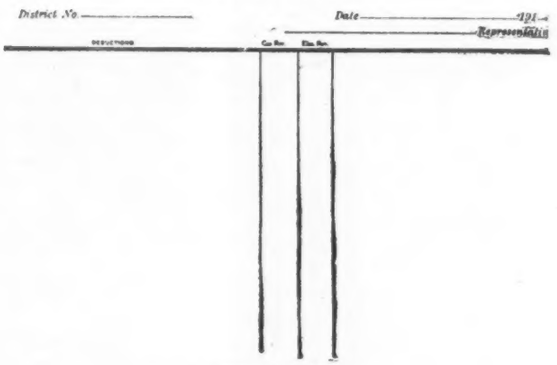
Form 5.

Each representative is given one of these forms each day, showing what orders have been executed on his territory. A number of these orders may have come in through the office, but at the same time the representative should get credit for the business that comes in this way as an offset to the amount of gratuitous work he is called upon to do.

Form 6 shows completed orders of each representative in detail,



Form 6 (Front).



Form 6 (Back).

giving name and address, kind of appliance, service, meter, estimated revenue and number of points, also new or old business. These are made out accumulatively, each day's business being carried forward.

I realize that there are a great many things done by the representatives under the head of new business that would have to come under the head of gratuitous work, were it not for this department, as it often takes a great deal of a man's time to satisfy a consumer who, from his point of view, has a just complaint an account of "high bills" or "poor service;" but right here is where the representative who has the proper qualities in him has a chance to show his ability by quickly satisfying the consumer, and, by good salesmanship, sell him some extra lighting for his business.

If this department were run as a separate business entirely, then, of course, all the representative's time would be devoted to new business only; but I do not think that this would be practical, as the new business department is too closely allied to the other departments. Before I leave this part of the subject, the Form 7 cut shows a form that can be very readily used in the checking up of each man, both as to class and volume of business. If each man's business is kept independently on this form, his work, relatively with every other man's, will show up quite plainly, and an interchange of men on the various territories will determine the proper place for each man. This form should go through the distribution department to get the cost to the company of business, signed by each man, giving a further check on the net value of each man's business to the company and also securing prompt attention of the fitting department to the business closed by the representative. It is also a check on the gross business which each man signed up. The estimated revenue can be periodically checked up with the actual gross received, as shown by the consumers' ledgers, to make sure each man is receiving proper credit for his work and to avoid errors in using these figures for future estimates.

Cost of Appliances Sold.—This data comes mostly from the appliance department, which has a direct bearing on the new business department, as the appliance sales are merely a second step, following the closing of a man's contract in most cases. It is very important to keep accurate record of every appliance that is sold from the time it leaves the warehouse until it is paid for, and this takes a lot of detail. For all ranges, water heaters and other large appliances a lease is taken and signed by the purchaser, showing make and number of appliance, gross price and net price, and how payments are to be made, as shown in Form 8.

NEW BUSINESS REPORT Ending ..... 19..

BUSINESS ..... GAS DEPARTMENT ..... CO.

ATTENTION IS CALLED TO RULES ON BACK OF THIS REPORT.

Form 7.

LEASE OF GAS APPLIANCE

TO THE COMPANY:

The subscriber ..... hereby applies to the Gas and Electric Company for the use of a gas range, water heater, Baron heater or grate ..... known as ..... together with the necessary feed pipes and connections therefor; the same to be delivered and connected ready for use by said Company, at the premises now occupied by the subscriber and known as ..... St.,

For the use of same the subscriber agrees to pay as rental the sum of ..... Dollars before the delivery of said appliance, and the further sum of ..... Dollars each and every month thereafter for a period of ..... months, unless this lease by reason of the default hereinafter mentioned, or any of them, shall be sooner determined. The said monthly sums shall be due and payable at the time the bills for gas consumed, as measured by the meter provided for that purpose, shall be payable, in accordance with the rules of said Company, the first of said monthly sums to be payable at the time the first gas bill after the delivery of the appliance is payable. If the use of gas in said appliance be temporarily suspended, the rate of rental and the time of payment thereof shall be the same as when gas is used in said appliance. The subscriber further covenants and agrees:

First. To keep said appliance and connections at all times in good condition and repair, and on the termination of this lease, for any reason, before the expiration of the term above provided for the performance of all the conditions thereof by the subscriber, to deliver the same to the Company in as good condition as when received, ordinary wear excepted, and to permit the Company, by its agents, at any and all times to have access to the appliance and connections, and to enter the premises wherein the same may be for the purpose of removing or removing the same.

Second. Not to remove said appliances and connections, or any part thereof, or permit the same to be removed from the place above mentioned, without the consent in writing of the Company, and not to assign or lease or sublet said appliance, or any part thereof, without the written consent of the Company; not to sell, or attempt to sell, assign, incumber or otherwise dispose of said appliance and connections, or any part thereof; not to violate any law or ordinance in respect to the use of said appliance, or the meter, feed pipes or attachments connected therewith, or the gas used in the same.

Third. To permit the Company, at its option, after inspection of said premises by it, before the appliance herein above mentioned is connected, to cancel this lease and return the first payment made hereon.

Upon the failure or neglect of the subscriber to keep or perform the foregoing covenants and agreements, or any or either of them, the right of the Company is hereby recognized to, at its option, immediately, without notice, declare this lease terminated and all rights of the subscriber thereto terminated, and to regain possession of said appliance and connections wherever the same may be, with or without force and with or without legal process, at the expense and cost of the subscriber, which said expense and costs, in addition to the rent theretofore paid by said subscriber, as herein above provided, shall be considered as liquidated damages due to the said Company.

When the total rental hereinabove provided for shall have been paid, and the covenants and agreements in this lease shall have been fully performed by the subscriber, the Company agrees to give to the said subscriber a bill of sale for the said appliance, NOT INCLUDING ANY FUEL PIPING OR CONNECTIONS FURNISHED BY THE COMPANY CONNECTING UP SAME, ALL OF WHICH FUEL PIPING AND CONNECTIONS SHALL AT ALL TIMES REMAIN THE SOLE PROPERTY OF THE COMPANY; but it is expressly understood and agreed that until such bill of sale shall have been given, the subscriber has no title to, interest in or ownership of said appliance, but the same shall be and remain the sole property of the Company and subject to this lease.

In Witness Whereof the subscriber hereto has affixed his hand and seal.

(SIGN FIRST NAME IN FULL)

Total Rental, $ .....

Net Rental, $ ..... (SEAL)

Form 8 (Front).

Form 8 (Back).

Send Statement of Rental to.....

Address..... St. Ave.

NOTE.—State plainly in above space the name and address of party to whom Bills for Rentals are to be sent.

The leases are then passed upon by the credit department, as to the standing of the purchaser. If there are any bad debts against the purchaser, he must pay up the account before the appliance is connected. From these leases the requisition is issued to the storekeeper, four copies being made. Two go to the storekeeper, one to the fitting shop, and one stays in the office. When the storekeeper gives out the appliance, the fitter receiving it signs the requisition and it is returned to the office. This shows that the fitting shop has received the appliance and is ready to connect.

APPLIANCE DEPT.

Form 27-6-10-00-100 Pads.

The.....Company.

Original Requisition.

No. 18887 Date.....19..

Name.....Lease No.....

For

Address .....Order No.....

Storekeeper, deliver to bearer articles listed below.

Quantity.	Stock No.	Description of Article.
.....	.....	.....
.....	.....	.....

The Gas Company

By.....

Received the above articles.....

Date.....

Form 9.

In order to take extra precaution against any of these orders being lost, it is a good plan to enter them in a day book at the time the order is issued and check off when completed. This is as far as we can go at present with the appliance, so will pass on to

Connecting Appliances.—The order is issued in triplicate, one office copy and two shop copies. One of the shop copies is returned to the office when the appliance is connected. These orders go to the fitting shop, along with the appliance requisition. The fitter connects the appliance, using what pipe and fittings are necessary and makes a note of the material used on the back of the order.

The Co. Fuel Pipe Order No.

Address..... Requisition No.....

Name ..... Consumer Old New

Connect Old New

Date

FITTER'S REPORT.

Connected (Old-New).. ..... House (Old-New)

Name of Range.....Bo't of.....

Was House Previously Fitted for Fuel Gas....Fitter .....

Date Executed.....Helper .....

Fitter must take an accurate report of all appliances connected. If this is not done they will be required to do so at their own expense. Report material and time on back hereof.

Form 22-6a Original.

Form 10 (Original).

Sizes.	⅛	¾	1	1¼	1½	2		Cost.	
Pipe.....								..	...
Gal.....								..	....
Ells.....								..	....
Gal.....								..	....
St. Ells....								..	....
Gal.....								..	....
Tees.....								..	....
Gal.....								..	....
St. Tees....								..	....
Gal.....								..	....
Unions								..	....
Gal.....								..	....
Reducers ..								..	....
Gal.....								.	...
Bushings ..								..	....
Gal.....								..	....
Nipples....								..	....
Gal.....								..	....
Caps.....								..	....
Plugs... ..								..	....
Cocks.....								..	....
Hose bibbs.								..	....
" cocks.								..	....
Misce.....								..	....
									....
Fitter.....hrs.	Cost of Material.....							..	....
Helper.....hrs.	" " Labor.....							..	....
	Total Cost.....							..	....

CHARGE CONSUMER.

.....ft. Pipe @ $.....

.....ft. Pipe @ $.....

$.....

Approved..... .....

Form 10 (Back of Original).

Shop Copy Fuel Connection Order No.

Address.....Requisition No.....

Name.... .....Consumer Old-New

Connect Old New

Date

Fitter.....

Helper.....

Form 10 (Duplicate).

Office Copy Fuel Connection Order No.

Address.....Requisition No.....

Name .....Consumer Old-New

Connect Old-New

Date

Form 22-6a Triplicate.

Form 10 (Triplicate).

Dr.

S. B. Folio	Ledger Folio	Date	NAME	ADDRESS	DESCRIPTION	Lease No.		STOVES	Pipe and Fixtures	MISC.	Credit Account	Electrical Appliances	Gas and Electric	COKE	TAR	SERVICE	Construction	

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	S. B. Folio	Ledger Folio	Date	NAME	ADDRESS	DESCRIPTION	Lease No.		STOVES	Pipe and Fixtures	MISC.	Charge Account	Electrical Appliances	Gas and Electric	COKE	TAR	SERVICE	Construction

Form 11.

The.....Co. Street.....No.....

PETTY LEDGER. Name.....

Terms. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12

	Date.	Article.	Lease No.	Jour. Folio.	Charges.	Credits.	Date.	Balance.	

Form 12.

WEEKLY BALANCE.

Week Ending..... Wagon No..... Foreman.....

Article.	On Hand.	Materials Drawn	Total.	Materials Used.				Bal. on Hand.	Price.	Value of Stock Drawn.	Account Charged.			

Form 13.

So far as the appliance is concerned, the order is done with, and from this order the entry is made in the journal and posted from the journal into the consumer's ledger, and at the close of the month the total business is charged to the sales' accounts and "Promoting New Business" credited on the general books. A special journal is necessary for this work, one that you can carry forward each page until the end of the month.

For the consumers' ledgers a small, loose-leaf book is used, and the dead accounts are pulled each month. The pages of these books are arranged the same as the consumers' ledgers, which facilitate the going over bills for light to add any other accounts that may be due.

(To be Continued.)

Clark-Jewel Hotel Ranges.

Well in advance of those gas range manufacturers who essayed to revolutionize the fuel practice of the kitchens of hotels, hospitals and like institutions, will be found the name of the George M. Clark Company, of Chicago, the goods of which concern can now be found in many noted kitchens throughout the country.

The George M. Clark Company's hotel gas ranges are made in single and double sections—a sample of the former is shown in Fig. 1—which can be fitted together so as to make any length of ranges desired. They can be furnished with open grates or closed top, and with or without the high shelf. The whole combination is solid, and can be counted to withstand the heavy work that generally accompanies continuous use. For each single section the top burners consist of three 5-inch round, double, drilled burners, and two 8½-inch star-drilled bar burners. Controlled by one cock there is a small pilot flame for each top burner, which allows the burner to be turned on and off, as needed, without the use of a match, the flames being so small that the expense is negligible.

Fig. 2 shows 2 double sections, fitted together, one of which is of the open top sort, the other being of the solid type class. Mr. Jos. W. Peffley, the Company's Eastern representative, says that the demand for this class of apparatus is growing rapidly in Eastern territory, an opinion that is also shared and declared by the commercial division of our Consolidated Gas Company, and the Brooklyn Union as well.

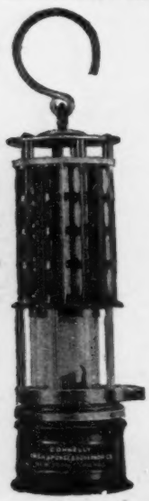
Fig. 1.

Fig. 2.

It may be remarked that the dimensions of the sections shown are: Oven, 32 wide; depth, 24; height, 16; top, 35 wide, 33 deep and 36 high; top shelf, 35 wide, 12 deep and 55 high—all dimensions being in inches.

A Universal Safety Lantern.

The Connelly Iron Sponge and Governor Company is putting on the market a safety lantern, having for its object the prevention of loss to life or limb from gas explosions in all places. The construction of the lamp, as the illustration shows, is exceedingly simple, the casing, top and bottom, being of alumina, guarantees lightness in weight and durability, along with quick handling. The flame becomes extinguished or goes out when the lamps are brought into a contaminated atmosphere, and to relight it it is not necessary to open the shutter, the relighting being accomplished by means of a patent device which can be put in action from the outside. All picking and cleaning and the raising and lowering of the wick can also be done instantly, or without opening the framework. Its lightness also recommends it, weighing as it does only 18 ounces. The Connelly Iron Sponge and Governor Company will be pleased to answer any inquiries regarding it. It seems hardly necessary to add that the Company's headquarters is in 127 Duane street, New York city.



PUBLIC LIGHTING TABLE FOR FEBRUARY, 1911.

[Communicated by The American Meter Company.]

Day of Week.	MOONLIGHT SCHEDULE.		
	Date.	Light.	Extinguish.
Wednesday	1	5.50 P.M.	6.10 A.M.
Thursday	2	5.50	6.10
Friday	3	9.00	6.10
Saturday	4	10.10	6.10
Sunday	5	11.20	6.00
Monday	6	12.40 A.M. F.Q.	6.00
Tuesday	7	1.50	6.00
Wednesday	8	3.10	6.00
Thursday	9	4.10	6.00
Friday	10	5.10	6.00
Saturday	11	No L.	No L.
Sunday	12	No L. F.M.	No L.
Monday	13	No L.	No L.
Tuesday	14	6.00 P.M.	8.00 P.M.
Wednesday	15	6.00	9.10
Thursday	16	6.00	10.10
Friday	17	6.00	11.20
Saturday	18	6.00	12.20 A.M.
Sunday	19	6.10	1.20
Monday	20	6.10 L.Q.	2.20
Tuesday	21	6.10	3.20
Wednesday	22	6.10	4.20
Thursday	23	6.10	5.10
Friday	24	6.10	5.40
Saturday	25	6.10	5.40
Sunday	26	6.20	5.40
Monday	27	6.20	5.40
Tuesday	28	6.20 N.M.	5.40

Items of Interest
FROM VARIOUS LOCALITIES.

Mr. George W. Gatehouse, whose rearrangement of the commercial division affairs of the Brooklyn (N. Y.) Gas Company more than met the expectations of its proprietors, has been appointed Purchasing Agent for the Company. His successor in the commercial division is Mr. Emil Korthaus.

The following is from Nashville, Tenn., under date of the 4th inst., and is signed by Mr. A. S. B. Little, General Manager of the Atlas Paint Company:

To the Editors American Gas Light Journal: Backed by your assurance that there was, and still is, a very great need for a company designed and exploited for the express purpose of preparing good paints for gas works uses, I entered enthusiastically into the field, and the literature that has been issued has had the one text for its sermons that, by doing good to the community, through the decoration of gas works' property, the Company would not only more effectively preserve its plants, buildings, meters, etc., but would at the same time create the increasing confidence likely to be shown in them by all their consumers. Your idea, which we have strenuously carried out, is sure to meet with excellent results for Gas Companies. One need only refer for confirmation to the recent complimentary letter addressed to the President of the Consolidated Gas Company, of your city, by the Harlem Board of Commerce. It will be noted by all gas men that the good feeling shown by that Board to the Standard Gas Light Company, of your city, did not really cost the Company anything, since in the ordinary course it would have endeavored to preserve its plant by the proper application of paint. However, by exercising good judgment in selecting paint, the Company picked one that would decorate as well as preserve, thereto incidentally making good friends while best looking after its own material interests.

At the semi-annual convention of the Massachusetts State Association of plumbers, steam and gasfitters, etc., which was held in Lawrence, Mass., the last week in January, the officers elected were: President, J. P. Murphy; Vice-President, P. J. Mooney; Secretary and Treasurer, F. D. McCarthy.

The Hartford (Conn.) City Gas Light Company has arranged to issue 20,000 additional common shares, of the par value of $25, to be offered to shareholders of both classes (common and preferred) in the ratio of 1 of new to 3 of old. The time to make avail of subscriptions expires April 1.

The Glidden Varnish Company has just sent a special representative to South America to locate there permanently, with the object of increasing its rapidly growing trade in that territory in its well-thought of concrete finishes and waterproofings. The representative is Mr. Torners, who sailed for his new field of work the last week in last January. His headquarters are to be in Buenos Aires. It is a noteworthy fact that the Glidden varnishes are really the standards in such materials in South America, South Africa, India and China.

The premises known as the Bogert factory, on Myrtle avenue, Flushing, Borough of Queens, N. Y., which has been out of commission for quite a while, has been leased by the Hochenburg Company, of New York.

At a fire in Springfield, Mass., some days ago, two members of the City Fire Department were badly injured by an explosion of gas, that could have been avoided by a sensible system of inspection, eked out with occasional examinations. This accident has caused the City Council to consider the subject of arranging for an amendment to the municipal ordinances whereby all gas piping shall hereafter be subject to inspection by the local authorities. The Springfield Gas Light Company, instead of offering any objection to the plan, will heartily indorse it; provided, of course, that no Councilmanic Rigoletto attempts to ask the Company to consent to the impossible.

Assemblyman Jackson is sponsor for a bill introduced in the Legislature making the rate for gas 80 cents per 1,000 cubic feet all throughout the Kings and Queens County districts of Greater New York. A bill of like nature was defeated in the 1909 session.

The Gas and Light Committee of the Petersburg (Va.) City Councils is considering the advisability of engaging the city in the con-

struction and operation of a gas plant on municipal account. While we do not believe there is any likelihood whatever of Petersburg engaging in this line of business for some time to come, it is nevertheless in order to say that if the city does so engage "the citizens" will soon be paying a higher rate than the current one—$1.35 per 1,000.

"THAT the 'radicals' are in the saddle in the Massachusetts Legislature is vividly shown in the action of the House some days ago, when the House, by a vote of 60 to 46, substituted the minority report, for the adverse report of committee, in respect of abolishing all charges over placing in the premises of gas users a gas meter of any sort, which legislation is sought by the measure known as the Griffin bill. The flapping of the wings of the birds of prey in the bayous of Louisiana, was never louder nor more discordant than the mutterings of the 'reformers' in Massachusetts are to-day.—BEACON."

THE net selling rate for gas in the Quincy (Mass.) district has been reduced to $1.40 per 1,000; a concession of 10 cents. When the present owners of the Quincy Company secured control therein (1906) the selling rate was $2.

AT the annual meeting of the Portland (Me.) Gas Light Company the Directors elected were: Messrs. Jos. A. Cunningham, Wm. H. Moulton, W. W. Thomas, Fred. N. Dow, Elias Thomas and Herbert Payson. The Directors subsequently completed the following executive organization: President, F. N. Dow; Vice-President, W. H. Moulton; Treasurer and Clerk, Burton Smart; Engineer and Superintendent, E. H. Yorke. The Company's business was carried on satisfactorily during the year, as these figures attest: Output for the 12 months, 176,514,500 cubic feet; percentage gain over 1910, equal to 7 per cent. The unaccounted-for gas figured at 5.4 per cent. as against 6.6 the prior year. The number of consumers, Dec. 31st, 1909, was 9,333, an increase of 671 for the year. In connection with this it is interesting to note that these relative money value consumptions were shown, the 12 months being taken as the total:

Value, Used.			No. of Consumers.
Less than	$3	per month	406
"	10	"	3,100
"	25	"	3,722
"	50	"	1,325
"	100	"	423
"	200	"	110
Over	200	"	65

Of the 400 who used less than $3 per month, 200 are occupants of offices in the wholesale or office district. The growth in consumers is well attested by the following statement covering a period of 50 years: 1860, 1,733; 1870, 2,528; 1880, 2,605; 1890, 2,972; 1900, 4,162; 1910, as above. In the last 10 years several miles of mains were laid to serve outlying additions to the city. The report of the President recommends the following, to which the attention of contractors is called: Additional carbonizing capacity, to the extent of 4 benches, enlarged and improved purifying facilities, increased storage capacity, to be secured through the erection of a 500,000 cubic foot holder to rest in steel tank.

THOSE interested in the project to operate a gas plant in and about Ephrata, Manheim and Lititz, Pa., a charter for which was issued last fall to the organizers of the Ephrata Gas Company, aver that the plant will be constructed this spring.

MR. J. W. HULL, for many years a Director in the Pittsfield (Mass.) Gas and Electric Light Companies, died at his home in Pittsfield the morning of the 2d inst. He was in his 69th year, having been born in New Lebanon, N. Y., March 26th, 1842. He was prominent in the banking and insurance interests of central Massachusetts for many years. Perhaps his most prominent business connection was with the Berkshire Life Insurance Company, of which sterling corporation he had been successively Secretary, Treasurer, Vice-President and President, and had been in its service for 39 years. He is survived by his widow and 5 children.

THE plant of the Worcester County (Mass.) Gas Company is in successful operation, at Palmer. Mr. C. M. Durell, of Spencer, has charge of the business end of the enterprise. It is proposed to extend the distributing mains to and through the outlying districts of Thorndike and Three Rivers.

MR. GEORGE BARNES, for a lengthy time the capable and successful Superintendent of the Clinton (Mass.) Gas Light Company, has resigned that post. He was impelled to this action by his weakened physical condition, brought about through an operation for appendicites performed early this winter. He will take a trip South, there to spend any time necessary to his complete restoration to health, which we earnestly hope will speedily be his portion.

THE brieflet issued each month, by the Consumers Gas Company, of Toronto, Canada, under the title of "Gas News," which publication is under the editoral supervision and direction of Mr. George W. Allen, has been enlarged by the addition to it of a "Page for Women." Of course, it is given over to ways and means of tickling the palates by and with delicately prepared dishes suitably prepared via the gas cooker medium.

MR. JOSEPH B. RUSSELL, who was recently elected Second Vice-President of the Boston Chamber of Commerce, is a member of the Board of Directors of the Boston Consolidated Gas Company.

"B. A.," writing under date of the 6th inst., from Louisville, Ky., forwards the following: "Mr. Benjamin Rankin, who, 30 years or more ago, resigned the position of Superintendent of the Louisville (Ky.) Gas Company, in the service of which he was in the period between 1849 and 1879, died at his home in that city, the morning of the 2d inst. The *Courier*, of the 3d inst., had this to say about him: "Mr. Rankin was 88 years old; death was due to infirmities of age. The dead man was born in Westport, Oldham County, Kentucky, but spent the greater part of his life in Louisville. When a young man he learned the brass finishers' trade, and worked thereat until 1847, when he entered the service of the Louisville Gas Company. Through a series of rapid promotions he became its Superintendent about 1847, and continued as such until the early eighties, when he resigned. He was a prominent Mason, and it was under the direction of Excelsior Lodge that the funeral ceremonies were carried out. The services were held in the Anchorage Presbyterian Church, the Rev. Dr. Heuser officiating, and interment was made in Cave Hill Cemetery. His immediate survivors are a daughter (Miss Emma) and a grandson (Mr. Russell Rankin), who is a prominent member of the Washington (D. C.) bar."

THE proprietors of the Rogue River Valley (Cal.) Gas Company are contemplating the advisability of supplying gas to Klamath Falls, Ore.

THH Public Service Commission has consented to an issue by the Westchester Lighting Co. of $2,824,000 of the first mortgage bonds of earlier date, the proceeds of which sale, at par or over, are to go to taking up the remaining ($343,000) bonded indebtedness of the New York Suburban Company, and to pay off any existing floating indebtedness. From the figures submitted to the Commission, at which time the Commission was asked to approve the issue, the excellent financial condition of the corporation was revealed. In fact, this arm of the Consolidated Gas Company] shows added financial strength almost every business hour.

WE are indebted to "J. S. T.," who forwarded the following from Sioux City, Ia., under recent date: "Samples of the gas furnished by the Sioux City Gas and Electric Company tested better than the standard demanded, according to the report submitted to Councilman Jonathan W. Brown by D. A. Barkley, gas expert of the Carnegie Steel Works, at Pittsburgh, Pa. Mr. Barkley looked into the Sioux City situation several weeks ago at the request of Councilman Brown. Mr. Brown had stated that he had received complaints regarding the quality of gas furnished. Mr. Barkley took samples of gas at Morningside and at Fourth and Pierce streets, and on reaching Pittsburgh he made thorough tests. Both samples tested out at 24-candle power in lighting qualities. This gives a margin of 1-candle power over what Councilman Brown believes should be the showing in all parts of the city. Mr. Brown figured that 23-candle power is reasonable. Councilman Brown was pleased with the report of the test for heating qualities. The test placed the heat at 684 B.T.U.'s, a margin of 84 units over the number required in Sioux City. Complete testing apparatus soon will be placed in the offices of the City Engineer. Gas will be tested for both illuminating and heating qualities. Orders have already been placed for the paraphernalia. Plans have been drawn whereby the Engineer's office is to be rearranged to accommodate the machinery. Tests will be made at regular intervals and reports submitted to the Company."

THE AMERICAN GAS LIGHT JOURNAL

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MONDAY, FEBRUARY 13, 1911.

The Market for Gas Securities.

The result for the week in the trading in Consolidated is virtually a draw. The opening to-day (Friday) was made at 143½ to 144, and there was quite some inquiry for it; in fact, the trading, as to volume, in these shares was larger for the first portion of this winter (December-January) than has been recorded in it for 3 years.

Brooklyn Union is steady, dull and strong. This season the Company will put in a large amount of money in new construction and reconstruction, and its business is growing at an amazing rate. The annual report of the Laclede Company, of St. Louis, must be exceedingly gratifying to the shareholders, in that an earning capacity of quite close to 9 per cent. per annum is shown.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

FEBRUARY 13.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	143¾	144
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	102	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,600,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	100	102
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	139	142
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	999,650	509	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	5/8	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	50	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000	-	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	5,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	111½	111¾
Preferred	2,500,000	100	91¾	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	92¾	92¾
Preferred	25,000,000	100	97	97¼
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	106¾	107
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,800,000	200	385	387½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

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Two Horizontal Boilers, 100-horse power each.
Two 20-Inch Wilbraham Exhausters, with engines on same bedplate
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Two 20-Inch McKenzie Exhausters, belted to engines.
One Compensator.
Two Air Condensers, 9 feet 6 inches diameter by 23 feet 5 inches high, 20-inch connections.
One P. & A. Tar Scrubber, 20-inc connections.
Two Water Condensers, 5 feet 7 inches diameter by 19 feet 9 inches high, 20-inch connections.
Two Water Concensers, 8 feet 6 inches diameter by 23 feet 3 inches high, 20-inch connections.
Two Walker Tar Scrubbers, 8 feet 4 inches square by 4 feet 11 inches high, 20-inch connections.
Two Ammonia Scrubbers, 13 feet long by 6 feet in diameter, 20-inch connections.
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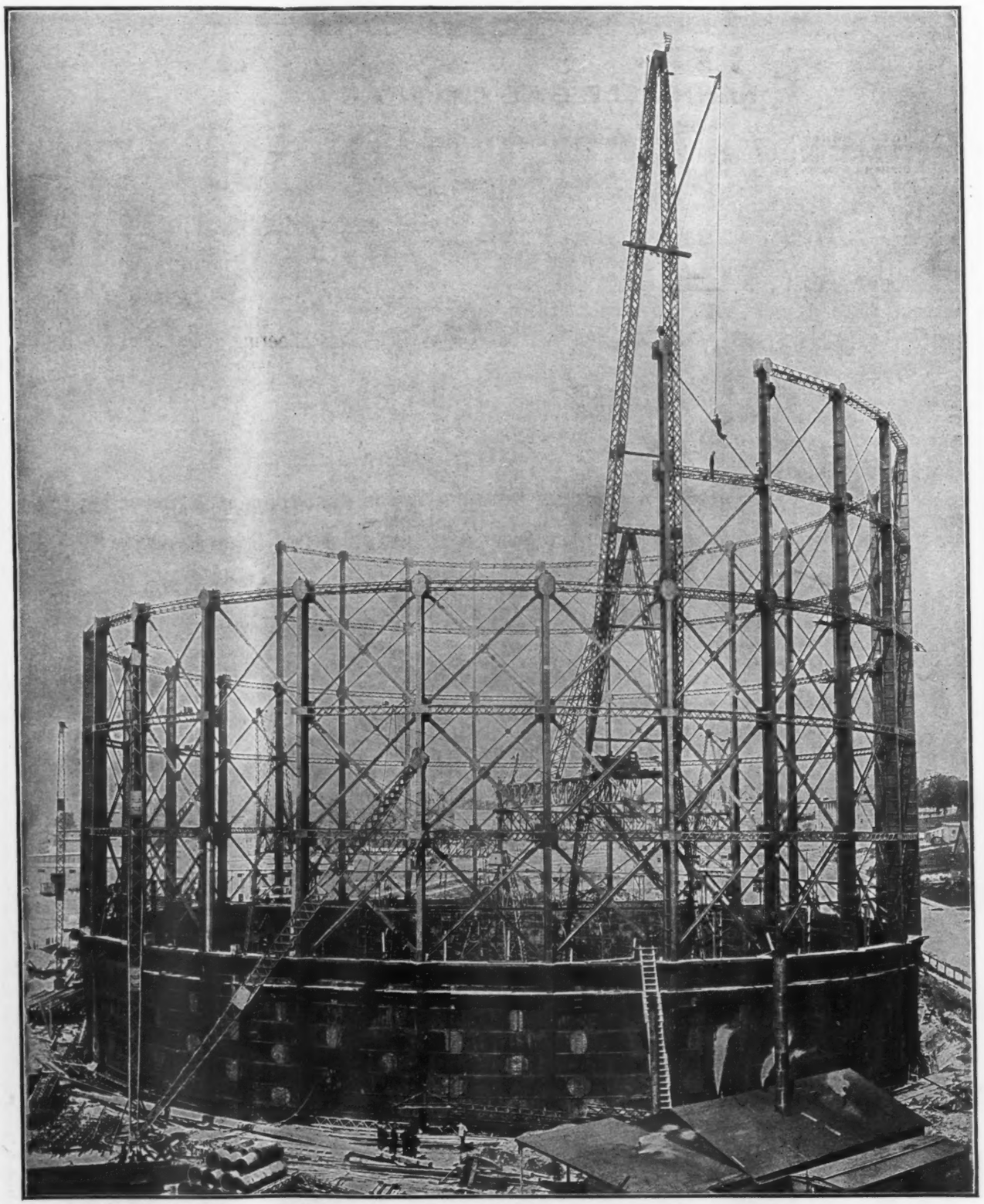

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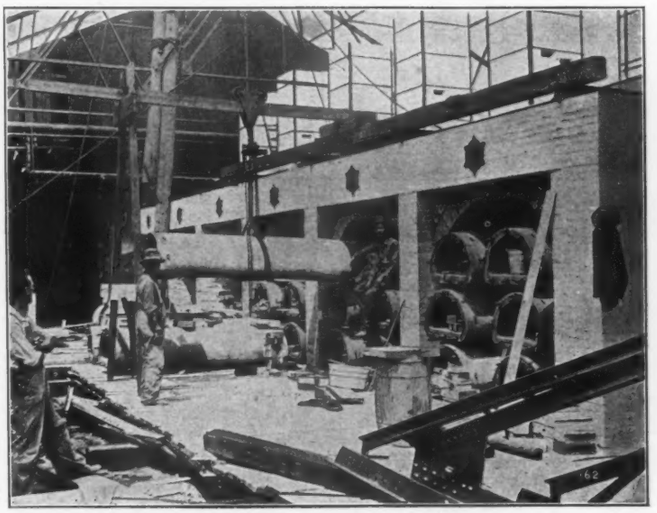

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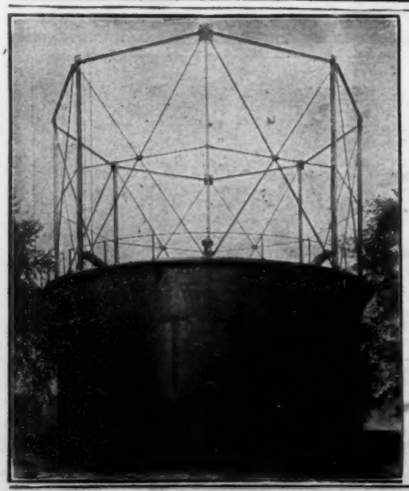

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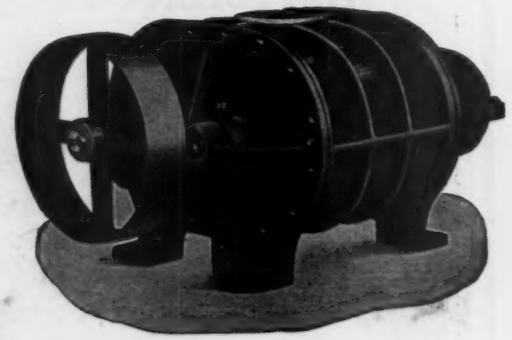

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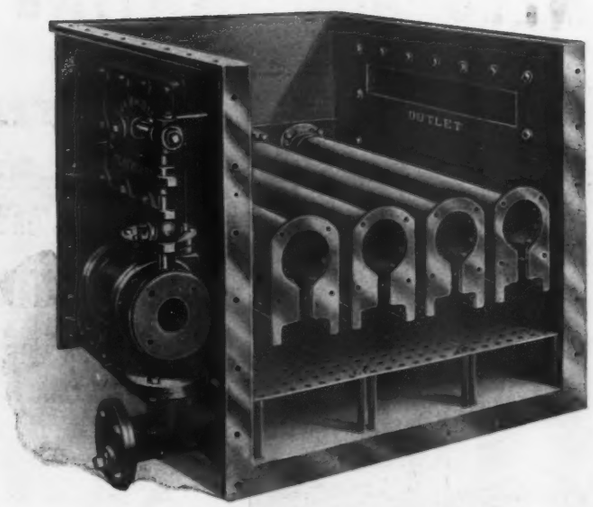

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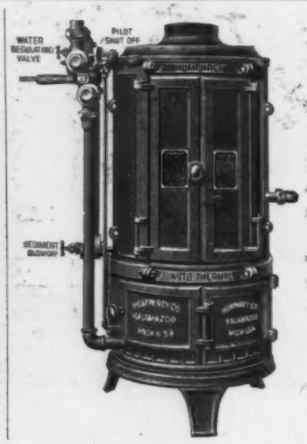

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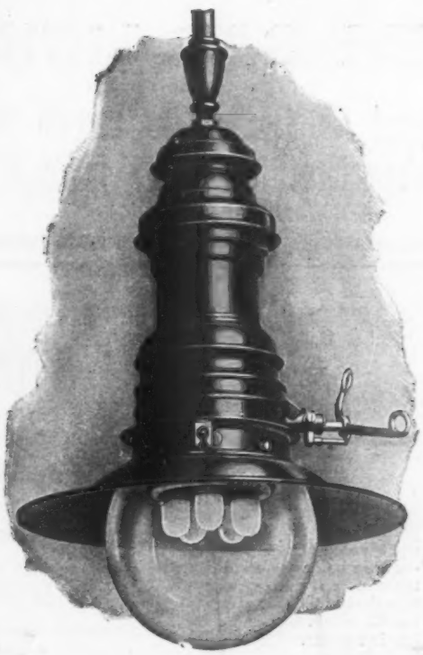

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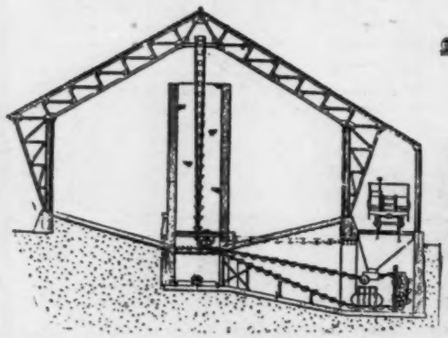

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MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911. ————————. Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1911. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, Oct. Chicago, Ill., 1911. Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 26 West 39th street. New England, Secretary, W. S. Farrow, 1230 Massachusetts avenue, Cambridge, Mass. Philadelphia, Secretary, G. B. Muth, 1000 Chestnut street Chicago, Secretary, F. H. Bernhard, Marquette Building.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, June, 1911, ————————. Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, Sept. 20, 21, 22, 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13, 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December 5-12, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 16, 17 and 18, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Columbus, O. Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1911; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Leach, Jr., Oakland, Cal.; Vice-President, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, Waterbury, Conn.

Southern Gas Association.—Annual meeting, April 19-21, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1911; Houston, Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May ————, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

Directory of American Gas Companies, 1910. Price, $5.00. For Sale by American Gas Light Journal, 42 Pine St. N. Y. City.

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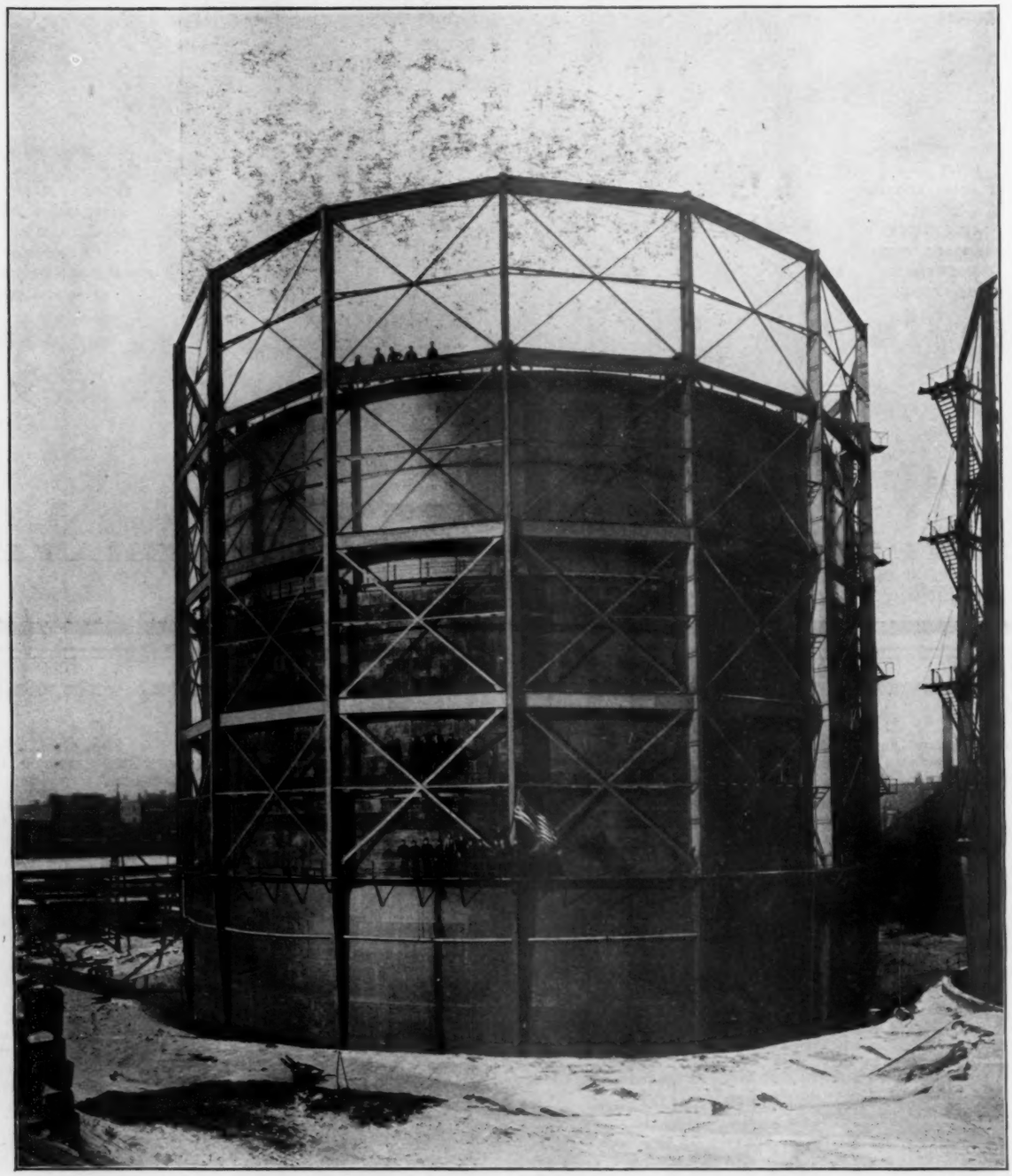

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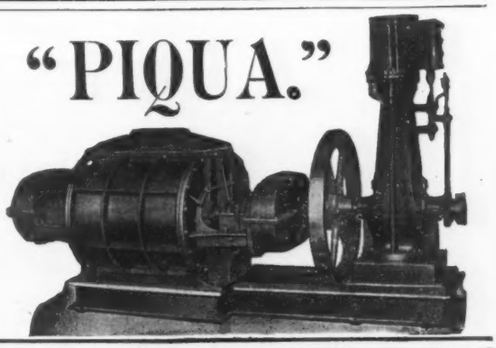

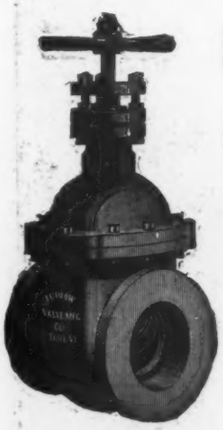

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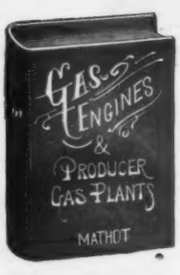

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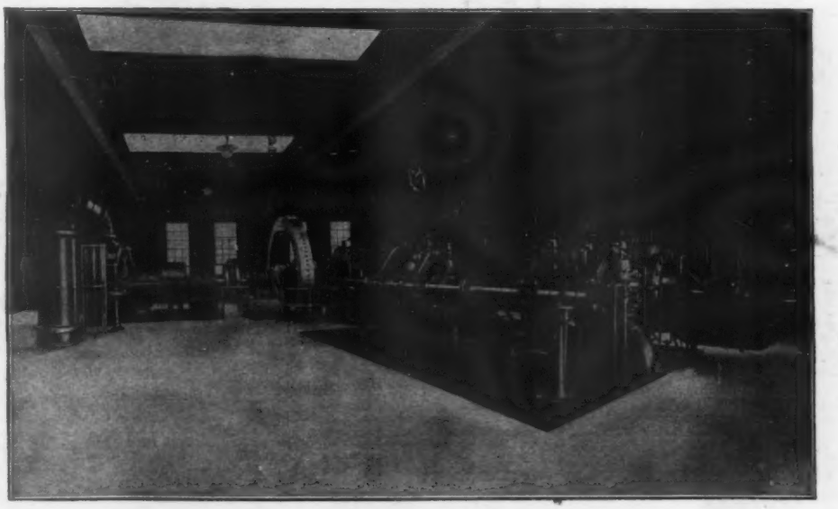

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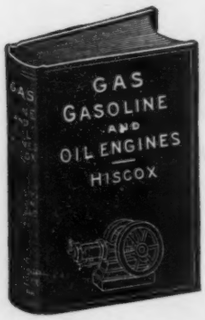

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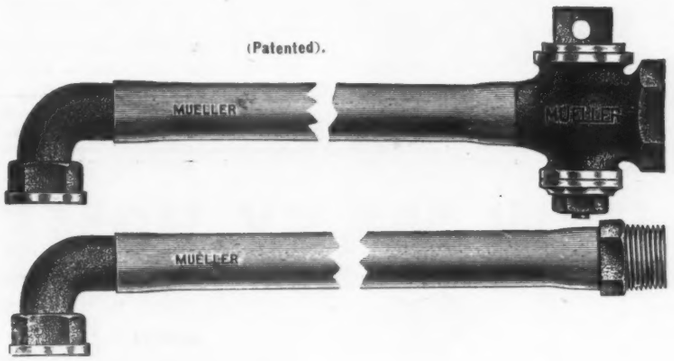

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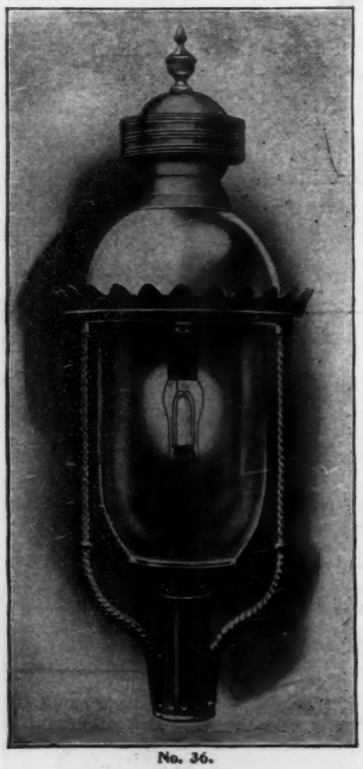

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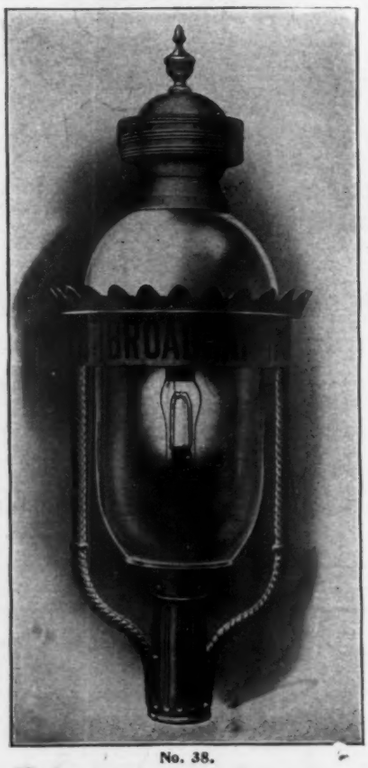

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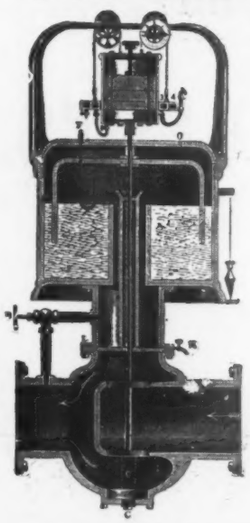

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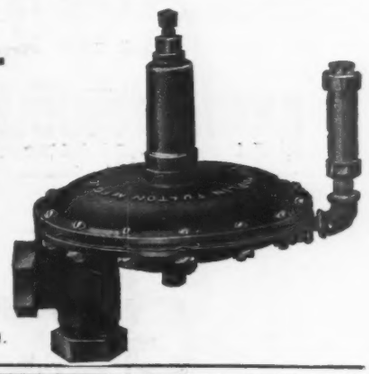

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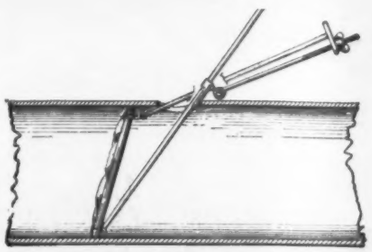

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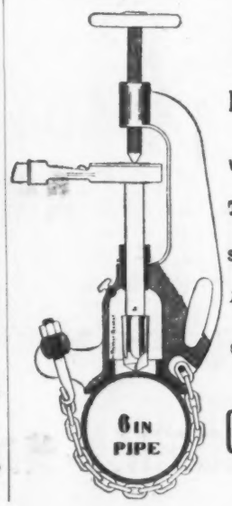

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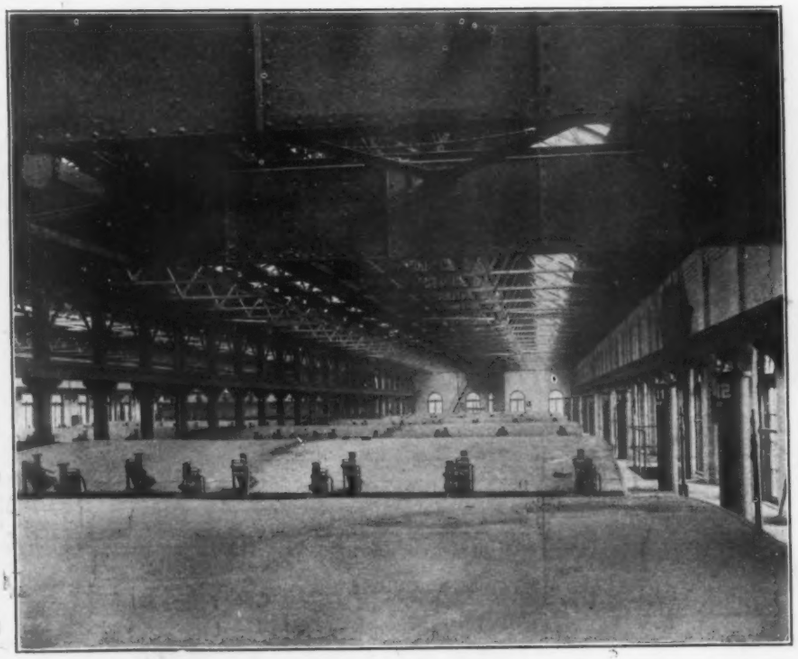

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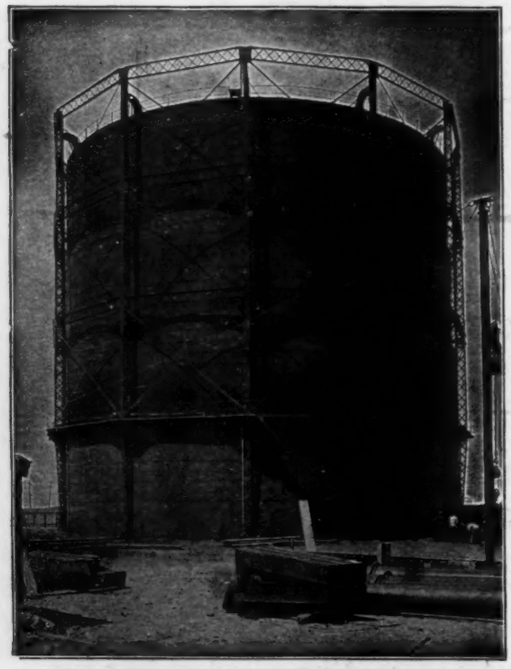

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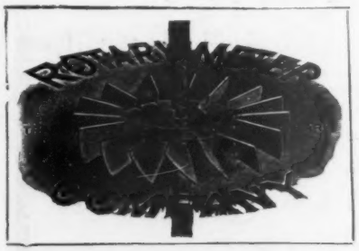

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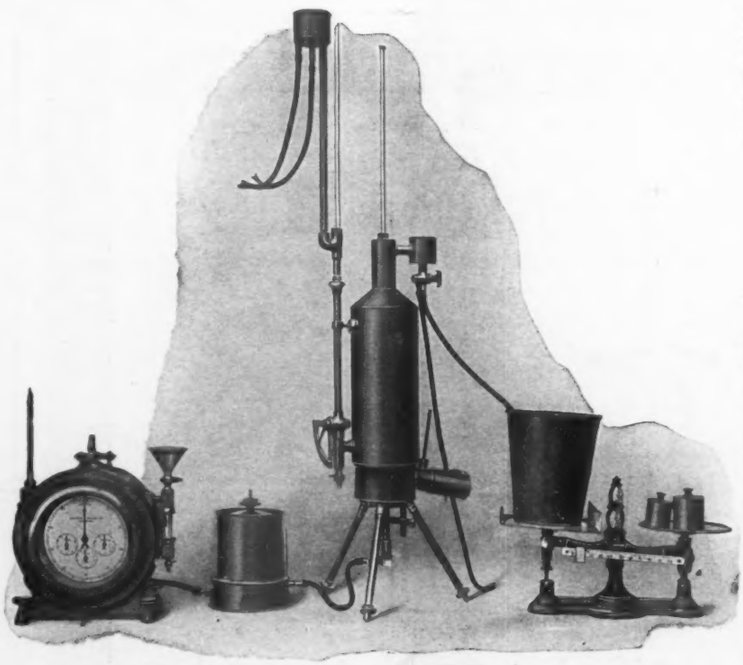

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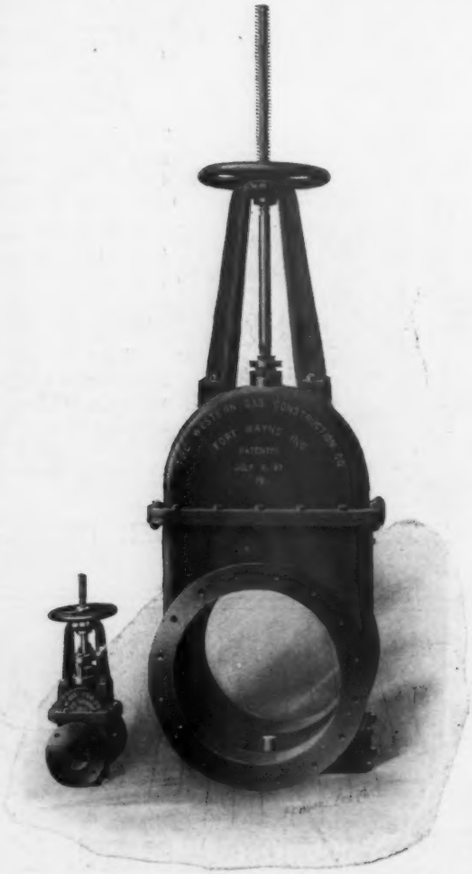

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